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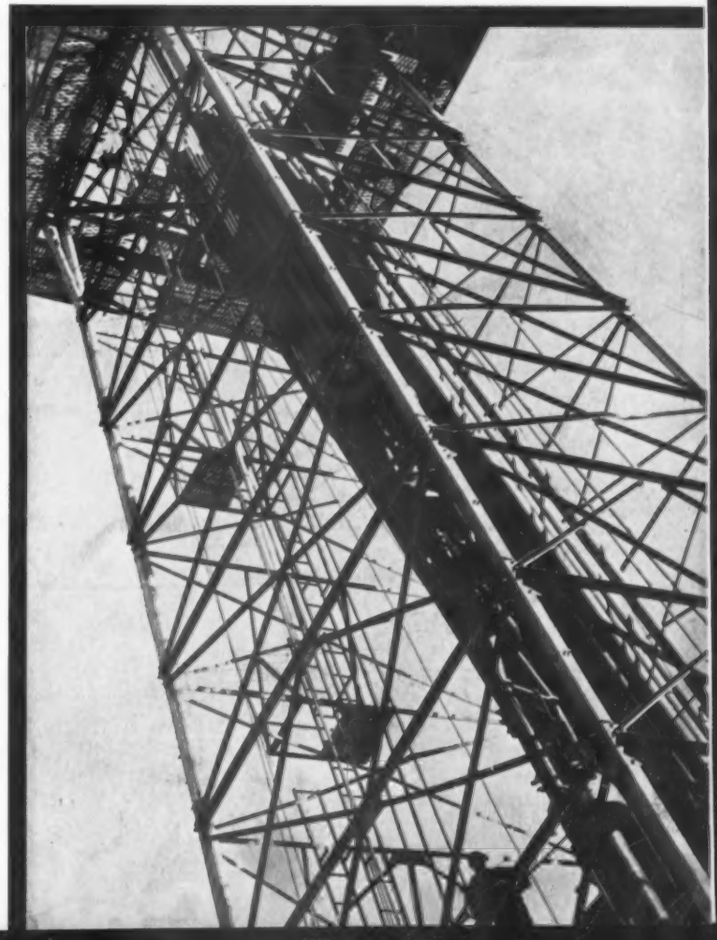
WORLD PETROLEUM

Peril of the Seven League Boots • Barco Concessions of Colombia • Venezuela Views Her Petroleum Affairs • Progress of Liquefied Petroleum • Far Eastern Market and Sakhalin Oil • Five Year Record of Major World Oil Companies •



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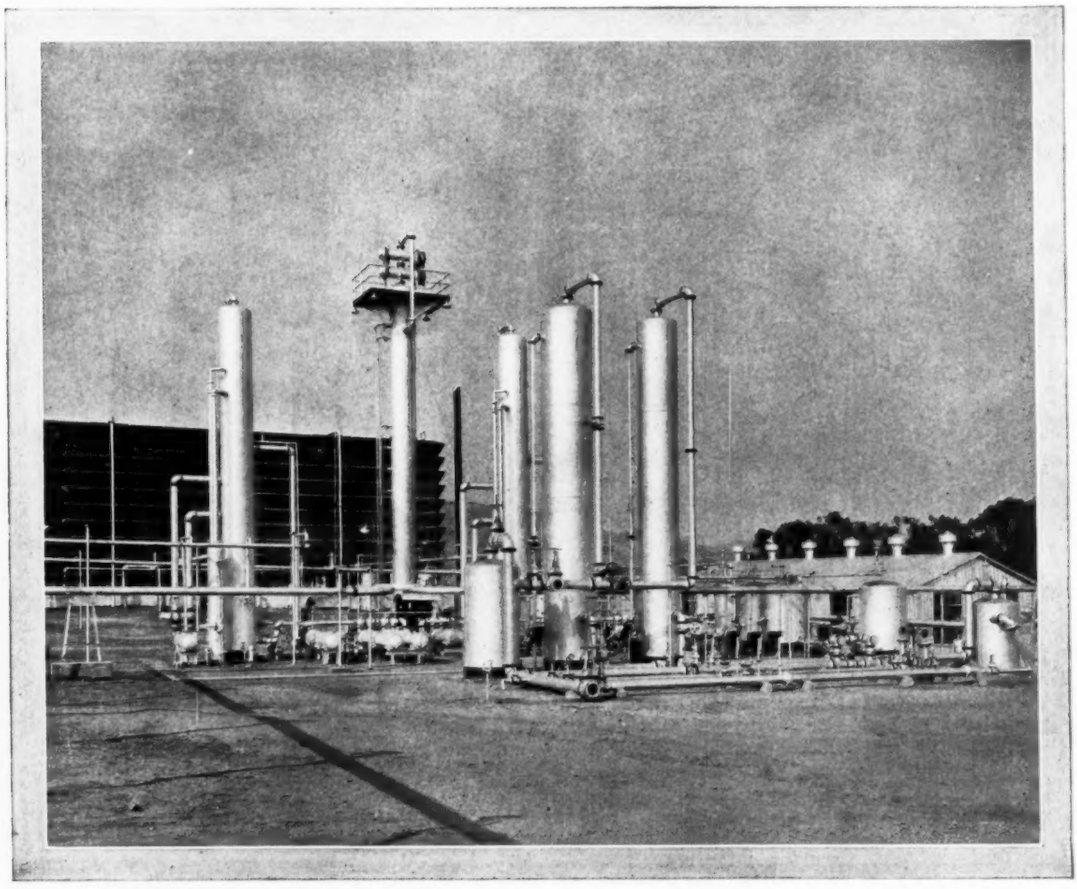

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JUNE
1931

WORLD PETROLEUM

(Incorporating "Petroleum Equipment Exporter")

VOLUME II NUMBER 6

CONTENTS

Frontispiece 356
Editorial 357
Production 390
Shipping 396
Finance 398
Equipment Notes 401

Special Articles

TITLE	AUTHOR	PAGE
Peril of the Seven League Boots	C. N. Edge	359
Barco Concessions of Colombia	C. K. MacFadden	363
Federal Storage of Surplus Crude	S. M. Decker	370
Developments in Fractional Distillation		372
Venezuela Reviews Her Petroleum Affairs		373
Far Eastern Markets and Sakhalin Oil		377
Progress of Liquified Petroleum Gas	B. T. Brooks	380
Functions that Drilling Mud Should Serve		384
Arc Welding for Oil Well Casing	J. F. Lincoln	386
Problem of Fuel Oil for Diesel Engines		388

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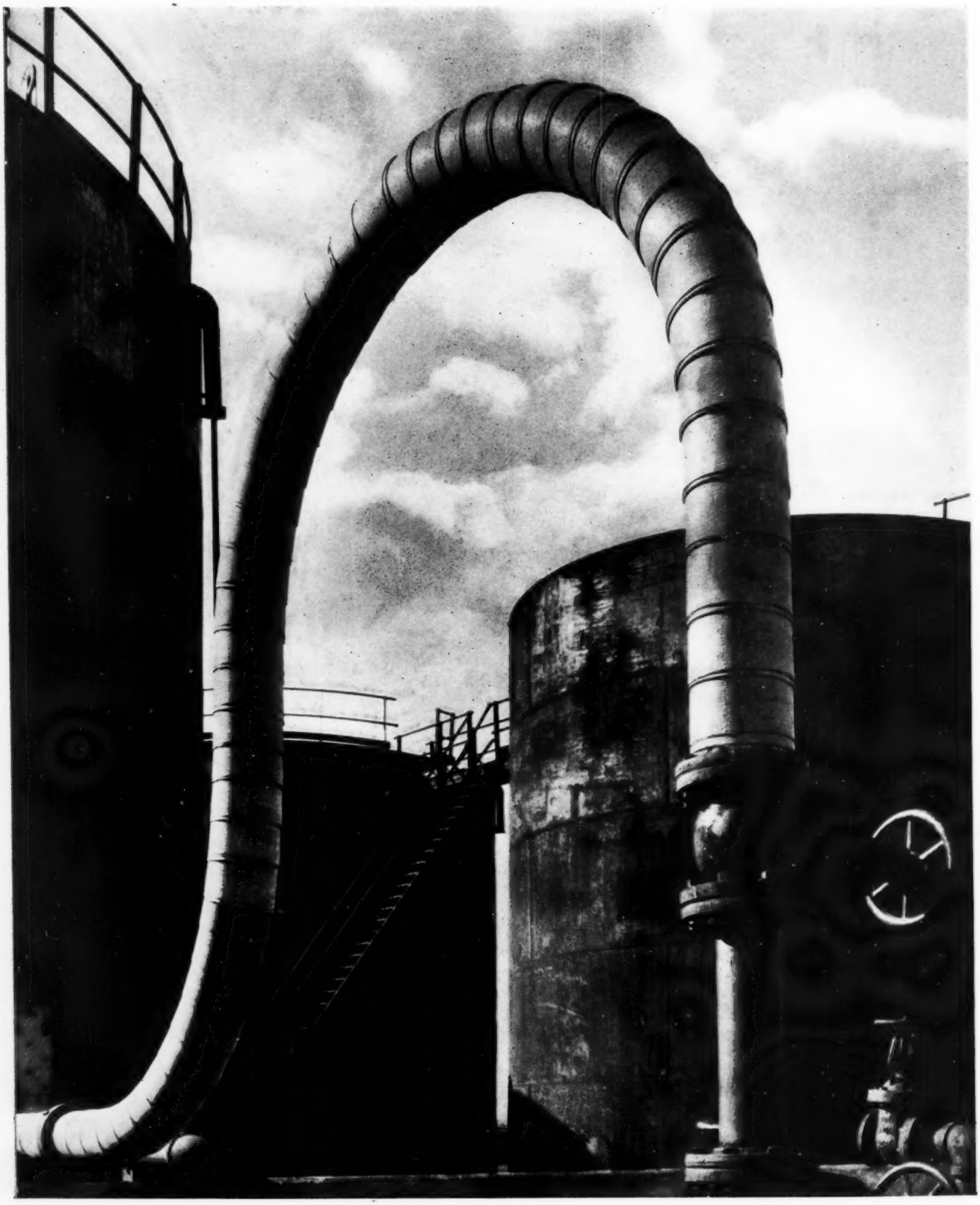

Steam Loop connection to tank field; construction view. M. Rosenfeld

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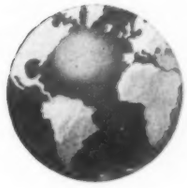

Russia's 450,000,000 bbl. of Crude

ELSEWHERE in this issue announcement is made that the Soviet Oil Trust has again increased its crude oil production plans. The amended program calls for an output of 350,000,000 bbl. for the year 1933 and 450,000,000 bbl. during the year 1934. The reason underlying this decision is not easy to discover; but the announcement may be considered to be more spectacular than of serious import. It is possible that it may be an incentive to the oil workers of Russia to redouble their efforts in order that they may actually attain the production quota of 331,000,000 bbl. set one year ago as the proposed output of 1933. Though lately producing crude at the rate of about 12,500,000 bbl. per month the major oil trusts are still behind their quotas. To fail to achieve the goal that has been laid down by Moscow is a serious matter for the oilfield officials. Consequently, the fact that they have been unable to produce the desired quantity of oil under the circumstances may have caused the authorities to appreciate the great difficulty, if not impossibility, of the task that they have ordered. They may feel therefore, that by stimulating activity to superhuman efforts there will at least be produced a tremendous quantity of oil.

On the other hand, as indicated in the May issue of WORLD PETROLEUM, the point appears to have been reached where Russia is having great difficulty in expanding her exports. In fact, this tendency seems partly due to unsettled world international petroleum market, partly due to unsettled world trade conditions, partly due to Roumania having become a strong competitive factor in Europe, and partly due to the steps quietly taken by international oil organizations to meet Soviet competition. Unless domestic consumption is increased heavily, these factors must effect Russian production as well as marketing, although the Oil Trust has just been successful in re-establishing its selling arrangements with the Spanish Oil Monopoly, which it lost to Roumania several months ago. The new production plan, therefore, may be a subtle wedge to enable the Oil Trust's selling organizations to pry open more widely the markets by implanting fear in the international oil industry that an increased flood of Russian oil will further disturb the price structure, unless the way is paved more smoothly for Russia to have a greater share of the business. In actual fact, Moscow is fully aware that it is more profitable to sell 25,000,000 barrels at a good price than 75,000,000 bbl. below cost, and so probably is amenable to reason.

Students of Russian petroleum activities feel that it will be practically impossible for the Oil Trust to handle the marketing of such an enormous quantity of oil outside of Russia, due to lack of adequate distribution and refining facilities in other countries. Furthermore, international marketing of a greater supply of crude and refined products is really a tremendous problem, the solution of which will require many more years of experience and knowledge, as well as the construction of distributing facilities abroad. This would require a large expenditure of money that cannot well be spared by Moscow at this time.

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Venezuela Today and Tomorrow

VENEZUELA, with its large crude production and its vastly greater potential output, is accepting curtailment calmly and in good spirit, and thus is doing its share toward stabilizing prices and general conditions in the world's industry. Unquestionably, the voluntary action taken in partially shutting down operations must have entailed a considerable sacrifice on the part of American, British and Dutch interests responsible for the major development that has grown with such rapidity during the past ten years. Russia, as a result of the reduction in Venezuelan output for the past nine months, has taken second place in world production and will probably hold this position at least for one or two years to come. Apart from Roumania, Iraq is the only other serious competitor to Venezuela on the horizon, outside of the United States, as the position of Mexico is in doubt. Because the company with the greatest interest in Iraq also has heavy investments in Persia, and as several of the other Iraq participating companies are producers in Venezeula as well as in North America, it probably will be a decade before the annual exports from Iraq exceed 50,000,000 barrels, and in any event they will not start for about two years. Just at present East Texas, with its very low-priced, excellent quality crude is the greatest obstacle to any tangible increase in Venezuelan pro-

duction. But, as many East Texas operators have been virtually committing business suicide by selling at prices far below cost, and overproducing at the risk of salt intrusion, today's situation can be but temporary. As first intimated in WORLD PETROLEUM, the total cumulative recovery of the newly discovered Texas pool probably is not much over 700,000,000 barrels. Hence, it should not be long before Venezuela comes back into its own as the world's second largest producer unless Russia greatly increases her domestic consumption. Venezuela's situation, close to the hub of the trade routes of the world, and adjacent to the largest refineries, gives it a position of great strategic importance.

▼

Killing Geese

TAXATION that retards expansion either of the petroleum or the allied automobile industry is likely to defeat its own object as a revenue producer. As a wise public policy the placing of additional burdens upon the business already most heavily taxed should be adopted only as a last resort. A story illustrating how easy it is for governmental authorities to kill geese laying golden eggs has just come from Australia, a country with a crude oil output virtually nil. Immediately following the announcement that an American company would erect a refinery at a cost of $5,000,000 and give steady employment to a number of men, the Commonwealth government imposed an import duty of 65 cents per barrel on crude petroleum. As this would raise refining costs to a point seriously interfering with profitable operation, it produces no surprise to learn that the company has found it necessary to suspend its construction plans.

Oil companies, however, are not without error. In these days of deficits in government incomes they fully appreciate that national and state authorities everywhere are desperately groping for means of increasing revenues. But, apparently they fail to realize that one reason why the oil industry is the first to be seized upon is that it lately has been rendered wide open to further impositions by motor fuel price slashings in almost every country. In a number of instances the additional taxes have been considered unjustified and unwise by both the public and the oil industry, especially when the proceeds have not been used for the original purpose of road construction. In Australia, the price of gasoline, burdened with a duty of 14 cents on motor fuel has been high. Nevertheless, the price has been maintained until now. Price cutting has just started, and very likely the powers that be will grasp the opportunity to increase both duty and tax if the price war makes substantial headway. Individual companies in their cry for gallonage, gallonage, consequently must share the responsibility of encouraging higher taxation.

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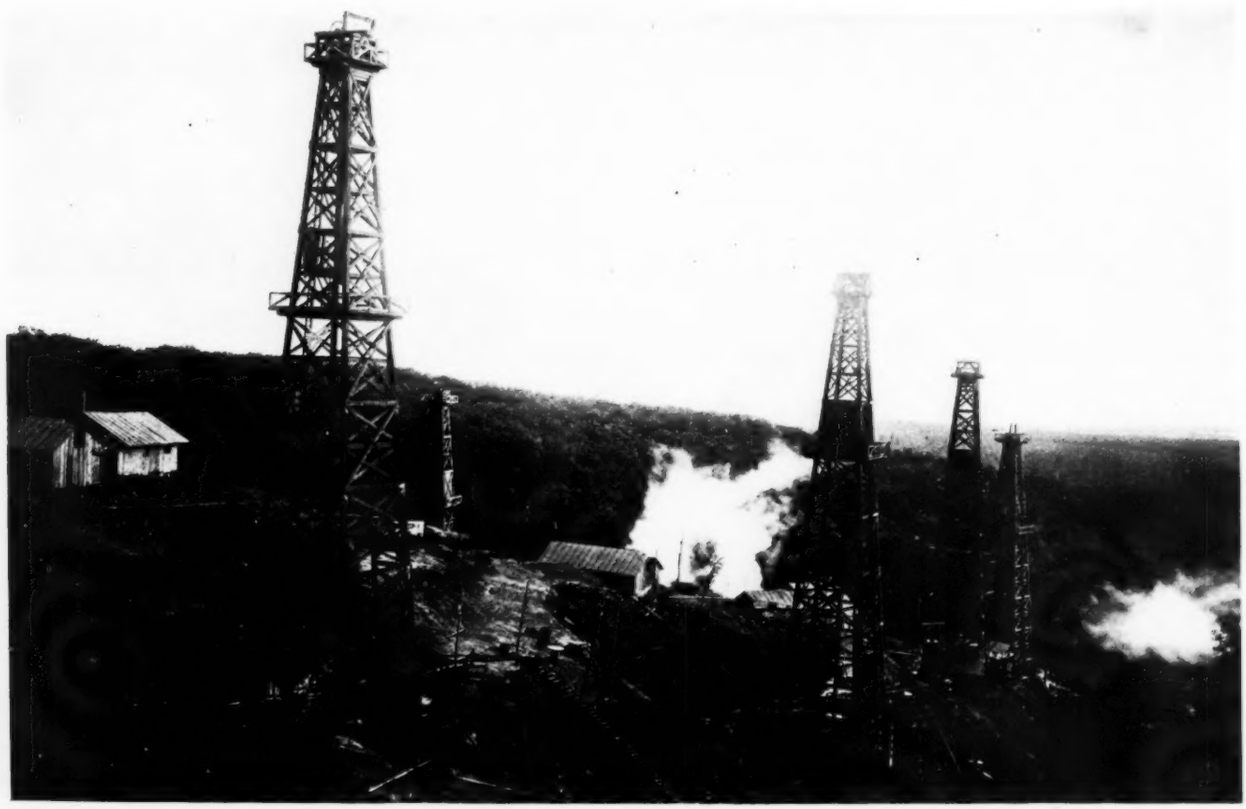


Roumanian petroleum products today are threatening the price structure in Europe. Moreni field.

Peril of the Seven League Boots

Effect of the Possible Saturation Point in the United States Automobile Market on the Future of the Petroleum Industry.

By Charles N. Edge

C. N. Edge and Company
Members, New York Stock Exchange

HAS the peak of absorption been reached by the motor car industry of the United States? If so, what are the implications for the future of gasoline manufacture and purveyance? These are questions of moment to the international petroleum industry. Because of their importance World Petroleum is glad to present in the accompanying article an analysis of the subject by an economist who views the situation from an unusual angle and presents it in an unconventional light. We are not convinced that the conclusions reached by Mr. Edge are inevitable but we believe that our readers will find his discussion mentally stimulating and deserving of careful perusal.

THERE are two classes of goods, necessities and luxuries. The laws governing the prices of these two classes are entirely different.

The price of a necessity is unstable, for the consumption of a necessity is not changed, or only to a very small extent, by a fluctuation in its price. The price depends solely upon the supply relative to an unchanged demand. Consumption of sugar will vary from its normal growth only a few percent, even if the price changes from 10 cents a pound to 2 cents. Consumption of coffee per capita has remained practically unchanged during the last 10 years, in spite of a drop of 80 percent in its price. The consumption of wheat will remain unchanged, even if its price declines to 25 cents a bushel.

Universal and uncontrolled use of machinery for producing necessities is perilous and has little or no virtue. The use of tractors on farms vastly and quickly increases production, both per man and in toto. It reduces the cost of production, but, a corresponding fall in price does not increase demand. Therefore, increased production lowers the price out of all proportion to the decrease in production cost and, in an extraordinarily short space of time, can produce ruin. The uncontrolled and untaxed use of the rotary drill has cost the oil industry perhaps, $4,000,000,000—eight years gasoline tax. Conversely the execution of all geologists (impracticable) would be an equivalent blessing. Overproduction of any necessity and the consequent fall of its price below the cost of production is worse than futile; it is sinful. There is only one remedy for the over production of a necessity and that is a period of under production. This normal method of recovery is now greatly hindered, for mechanical production in many hands ties up large quantities of capital, and limits its circulation.

It has, therefore, great momentum and is uncontrolled. Any plan of curtailment is individually expensive and becomes almost impossible to enforce. Even if the plan be partly successful, the individual desire to increase production becomes greater and greater in accordance to its success.

The laws governing luxuries are different, for prices of luxuries are stable. If mass production is used, and as a result production of automobiles rises enormously while their prices fall, then the demand expands to such an extent that production costs drop even more rapidly and profits can still be made. If the price of alcohol, newspapers, movies, and cigarettes are reduced, the same holds true—the demand increases extensively with each reduction of price. These are what are known as "appetite industries" or "easy money industries." In the "appetite industries" over production is serious, but not a cause of ruin, as a sufficient reduction in price will always increase the demand and check production. Mass production of luxuries is almost always successful until the buyers themselves are ruined and unable to purchase goods.

Laws governing the consumption of oil have changed. Oil was formerly only a necessity, used for light and heat. Demand showed a steady, constant growth, irrespective of price, except where a change of price displaced another commodity. Oil is still largely in the category of necessities; its price is still unstable, that is to say, a change in price will not tangibly change the demand, for the demand no longer has a constant growth as it depends upon the use of a luxury. Oil is now so inextricably interwoven with the use, and future use, of the automobile, that the demand for gasoline and lubricants, depends almost wholly upon the number of automobiles in use and the average extent of their use. That is, the future of the oil industry depends not so much upon the manufacture as upon the use of the most desirable luxury the world has ever known. Demand for this luxury cannot be satisfied, but ability to purchase and use it is definite.

A study of the future of the oil industry must, therefore, inevitably consist of a study of the future economic use of automobiles, the financial ability of the average citizen to use this luxury, and consequently a study of the farm problem. Can the people of the United States purchase 5,000,000 cars a year and support 25,000,000, or must the purchase and use be curtailed? The construction of refineries, the policy of storage, the embargo on imports, the control of drilling, the complete unitiza-

tion of oil fields, depends upon a correct answer. Has the use of automobiles and the demand for oil passed its economic peak or not?

Use of an automobile gives to the individual an inestimable privilege; it increases his working radius from 4 miles to 50 miles. The desire to possess this unbelievable power is so overwhelming, that possession of an automobile competes even against the desire for children! Desire for the possession of an automobile is greater than the fear of a mortgage! But there is also another side. Hand in hand with the automobile, the mechanization of farms has leaped forward. This is however, a left handed gift for it changes the economic unit area of a farm in one jump from 80 acres of tillable land to 9,000 acres. The result of this change gives Russia and South America, the sparsely populated continents, an advantage over North America in the cost of production of all grains, and their export. It might permanently change the standard of living in the United States and Canada.

Mechanization of farms (the application of mass production to necessities) where the total demand for products does not change, inevitably lowers the value of farms, farm products, and men, and must continue to do so, unless the birth rate of the nation rises and increase of products consumed equals the increase of production due to mechanization. On the one hand modern agricultural machinery has decreased the value of farm products, on the other, the adoption of the automobile lays a new and important item of expenditure upon the farmer's budget. It is most important to know whether he, as truly representative of the whole country, has paid for his automobile out of income or capital.

As far back as records go, more than 5,000 years, the wage of an agricultural worker has been half the crops he can produce and his capital value has been the value of the land he can till himself. In the United States the average value of the crops for 1927, 1928, 1929 was $12,300,000,000; they were produced by 8,500,000 male farm workers over 14 years of age, or $1,450 per worker. This gives an average wage of $725 a year, or $2.41 per day. The average wage in 1927, 1928, and 1929, throughout the United States was $2.46, $2.43, and $2.42 per day (without board). Under the same law the mathematical capital value of a farm worker can be ascertained from the fact that 8,500,000 workers till land (land and implements) valued at $40,000,000,000, giving each worker a capital value of $4,800 or an annuity value of approximately $400 per year. This again checks with the actual figures, for the monthly wage of farm labor, including board (his value to himself) in 1929 was $34.74, or $416.88 per year.

Table No. 1; Average Annual Operating Cost of All Automobiles in the U. S. A.

Number of passenger automobiles	25,000,000
Average cost of car	$625.00
Average mileage in 1925 (Est.)	5,500 miles
Average mileage in 1929 (Est.)	6,840 miles
Depreciation 20 percent	$125.00
Interest, 6 percent on $625	37.00
Gasoline	114.00
Oil	15.00
Tires	15.00
Repairs	20.00
Garage and supplies	35.00
Insurance or accidents	35.00
Taxes	15.00
Total	$411.00

Average cost per mile is 6 cents; total operating cost of all passenger automobiles amounts to $10,200,000,000; cost per capita for the United States (on the basis of 120,000,000 population) is $85.

The average cost of operating an automobile is shown in Table No. 1 to be $411 per year. It is obvious that a farm worker whose annuity value is $400 a year cannot afford even a large fraction of a luxury whose cost is $411 a year.

Table No. 2; Average Annual Farm Receipts and Expenditures

Receipts	
Gross receipts per farm	$1,900.00
Miscellaneous earnings (Estimated)	250.00
Gross Revenue	$2,150.00
Operating Expense	
Hired labor, sons over 14 years included, ½ year at $2.42 per day	$ 363.00
Average value of machinery $450.00—depreciated and renewed, 25 percent	112.00
Operation 0.13 truck and 0.14 tractor	50.00
Average value of buildings $2,000—depreciation and repairs, 5 percent	100.00
Fertilizers	30.00
Freight charges—22 percent of total freight in U. S.	180.00
7 percent on average mortgage of $1,810	127.00
Commission on produce 5 percent	95.00
Total	$1,057.00
Net income of average farm	$1,093.00
Expenditures	
Food for 3.8 persons per farm (24,000,000)—20 percent of total U. S. population consuming 20 percent of total crops per farm	$ 387.00
Clothing—20 percent of textile and allied industries	150.00
Taxes—school, village and state	95.00
Railway passenger fares	33.00
Heat, light and power	150.00
Cost of operating 0.85 car per farm at $415 per car per year	353.00
Radio	19.00
Tobacco and cigarettes	20.00
Professional services	40.00
Miscellaneous	150.00
Total	$1,397.00

Table No. 2 shows that farm mortgages between 1910 and 1930 have increased by an amount exceeding the total value of automobiles sold to farmers between these dates. The percentage of mortgages to total value does not seem very dangerous; but the amount of mortgages is continuously rising, and the value of farms under mechanical production will probably continuously fall.

It seems beyond doubt that the burden of operating an automobile cannot be borne continuously by an average farmer (even in 1929—a good year) and that the total number used by them, as well

The average total crop for 1927, 1928, and 1929, exclusive of feed for farm animals, was valued at $12,300,000,000, produced by a farm population of 27,200,000 on 6,300,000 farms. Hence the average farm population amounted to 4.3 persons per farm, consisting of 1.3 children up to 14 years of age, 1.5 adult males, and 1.5 adult females.

No debit has been made for seed, but full allowance has been given to home consumption of food. It is impossible to separate these items in the United States Department of Agricultural reports.

The estimated annual deficit per farm amounts to $301, while the estimated annual deficit on all farms amounts to $1,900,000,000.

Can the average farmer afford the luxury of an automobile? Table No. 2 shows the income and outgo of the average farmer in the United States, each operating 0.85 automobile. This table shows an operating deficit of $300 a year per farm. If these figures are corect, the burden of expense for operating automobiles has not been borne by income, but taken almost entirely from capital. In this case, the mortgage on the average farm must have risen somewhat in proportion to the number of automobiles sold to farmers.

The total increase in mortgages from 1910 to 1930 is, aparently, $8,000,000,000; but this figure may contain a considerable error as the U. S. Census of Agriculture reports mortgages only on farms fully owned, while in Table No. 3 the ratio of mortgages to average value has been applied to all farms.

The total value of automobiles sold to farmers from 1910 to 1930 is estimated at 25 percent of all sales. This amounts to $7,000,000,000, or just $1,000,000,000 less than the increase in mortgages for the same period.

Table No. 3; Relation Between Farm Mortgages and the Total Cost of Automobiles Sold to Farmers

Year	Average Value of Farm	Mortgage per Farm	Total Mortgages (Estimated)
1890	$3,444	$350	$2,200,000,000
1910	6,289	550	3,450,000,000
1920	11,546	1,050	6,600,000,000
1925	9,564	1,490	8,800,000,000
1930 (Est.)	9,000 (Est.)	1,810	11,450,800,000

as their average use, must be curtailed. The present rate of increase of mortgages, as shown by the annual deficit on farms in Table No. 2, would produce a crisis in farm mortgages in 10 years. Table No. 2 is an unbiased estimate, but subject to large non-cumulative errors. Table No. 4 shows a series of unit figures per capita of the United States.

The two largest per capita items of expenditure are the operation of automobiles and the raising of all children. These two items are definitely competitive, both are luxuries, the most eagerly sought for, but both cannot be maintained by the average citizen.

Table No. 4; Comparative Per Capita Costs

(On the basis of United States population, 120,000,000)

*Operating passenger automobiles	$85.00
Total expenditure of U. S. Government	32.96
Interest on public debt	5.44
War Department	3.80
Gasoline tax	4.20
Individual income tax	9.50
Total U. S. Exports	43.00
Total farm products	103.00
Consumption of fish	1.00
Railway passenger revenue	7.30
Total educational expenditures (1928)	16.20
Feeding, clothing, educating, etc. all children in the U.S. between the ages 0 to 14 yrs.	54.00

* Including chauffers, this figure would be 97.00.

With an average birth rate from 1915 to 1921 of 24.2 per thousand, and the average number of automobiles in use during the same period amounting to 6,000,000, we get the following table.

In Table No. 5 the correlation coefficient between the loss of children (unborn), which would have been born under the average birth rate which existed between 1915 and 1921, and the loss which would have taken place under the simple rule that 100 automobiles cause the yearly loss of 3.2 children, is so high that, mathematically, it is more than probable that the loss of births is definitely caused in about this ratio by the use of automobiles.

Never in the history of any country has its social structure been so overwhelmed in so short a time. The automobile can, and does, produce ruin. It can, and does, change the vital statistics of a country to an alarming degree. This change will undoubtedly continue until a sudden awakening and realization of the social and financial peril sweeps the country.

It seems probable, in fact almost certain, that the oil industry has reached the highest possible demand for its products which can be supported continuously by the people of the United States.

Theoretically an ideal business would be one where the demand for its products increased beyond all others; where demand was not affected even by an increase in price; the ideal years would be when this increase of demand occurred; the ideal place, the center of this demand. The answer would be the oil business, between 1920 and 1930 in the United States.

Practically, conditions as ideal as this brought into being organizations so powerful, landowners so greedy and eager, geologists so learned, engineers so skilled, that their combined intense efforts have produced an uncontrolled engine of production. The ideal time has passed; an immense business, but no longer one to jump forward by leaps and bounds, still remains, the ideal place still exists.

The intense combined efforts of the powerful organizations, the eager landowners, the learned geologists, the skilled engineers, must be directed upon the equally difficult problem of building, not a temporary, but a permanent "governor," for the engine of production they have constructed. An engine ungoverned runs away and brings ruin and destruction.

Table No. 5; Loosing Fight of Children Against the "Seven League Boots"

Year	Birth rate	Population	Actual number of births	Birth at 24.2 rate	Loss of children (unborn)	Loss of children if each 100 cars over 6,000,000 = loss of 3.2 babies per year
1922	22.5	109,000,000	2,450,000	2,640,000	190,000	151,000
1923	22.4	110,000,000	2,460,000	2,660,000	200,000	237,000
1924	22.6	112,000,000	2,550,000	2,700,000	150,000	300,000
1925	21.4	115,000,000	2,460,000	2,780,000	320,000	370,000
1926	20.6	117,000,000	2,430,000	2,830,000	400,000	420,000
1927	20.6	118,000,000	2,450,000	2,860,000	410,000	450,000
1928	19.7	120,000,000	2,360,000	2,900,000	540,000	520,000
1929	18.9	122,000,000	2,300,000	2,920,000	630,000	550,000
1930	18.3	122,000,000	2,240,000	2,920,000	680,000	615,000
				Total loss of children (unborn)		3,520,000

▼

Book Review

THE PEOPLE AND POLITICS OF LATIN AMERICA, by Mary Wilhelmine Williams, Ph.D. (Ginn and Company, publishers, $4.60). Although intended primarily for a text book, *The People and Politics of Latin America* should prove of interest to the general reader and of considerable value to those commercially interested in that section. The necessity for careful study in order to acquire a thorough understanding of a people with a cultural tradition and background so different from that of the North Americans is obvious at once to anyone familiar with Latin America.

Professor Williams' book is a most complete history, written in a manner sufficiently interesting to make it pleasant reading. The author's several trips to all the Latin American countries, her distinguished work at Goucher College, and the vast number of sources consulted assures the reader of a comprehensive and authorative history.

Starting with the geographic influence and the aboriginal Americans, the book covers the history, partly political, but largely social, of all the Latin American countries. It includes the principal political, environmental, and social factors that have contributed to the formation of the character of the several Latin American nations.

The book covers some 800 pages and is followed by a complete bibliography and index. It is profusely illustrated.

Five-Year Record of Major Oil Companies

Comparisons for the Last Half Decade of the Financial Records of a Dozen Leading Oil Companies of International Character.

By C. C. Bailey

THE attached five-year comparative exhibit of income and balance sheet items covers a dozen of the most important companies operating in the oil industry on an international basis. It is of special interest because this particular five year period embraces two years of depressed earnings, i.e., 1930 and 1927. The low prices of 1927 followed discovery of the Seminole area in Oklahoma, and recovery of earning power in 1928 was quite rapid. The poor earnings of 1930 resulted from a combination of overcapacity and overproduction throughout the industry, which has quite demoralized the price structure of both crude and refined products. Conditions this year, from the standpoint of profits, have been worse rather than better, so that recovery such as followed 1927 seems likely to be postponed until 1932, or longer.

It may be noted in the tabulation that the 1930 balance sheet items, (total assets, net working capital and bookvalue) do not show the uniform shrinkage from 1929 that characterizes net earnings. As might be logically expected gross revenues do not show as great percentage decline as net, since maintenance or increase of volume was only accomplished at increased expense; furthermore inventory losses assume important proportions when price declines are as substantial as have been witnessed during the past year.

It is perhaps worthy of comment that these major oil companies maintained their working capital position so well; although in some cases the amount of cash and equivalent showed more substantial decline, since net working capital was aided by reducing outstanding current liabilities.

Only one of these companies actually reported a deficit for 1930, although one other avoided it by including in the year's earnings a substantial non recurring profit derived from sale of capital assets. In 1927 all of these units operated at a profit. Reports for 1931 will be of even greater interest.

Five Year Statistical Exhibit—Major International Oil Companies

(—000 omitted)

Item	Year	Gulf Oil	*Royal Dutch (Florins)	Shell Union	Sinclair Consolidated	Std. Oil Calif.	Std. Oil Indiana‡	Std. Oil New Jersey	Std. Oil New York	Texas Corp'n.	Tide Water Associated	Union Oil of Calif.	Vacuum Oil
Total assets (after deducting depreciation and depletion reserves)	1930	$482,723	k790,869	$471,913	$404,860	$610,296	$801,184	$1,770,994	$720,305	$581,897	$248,302	$222,731	$240,546
	29	430,845	743,528	486,484	400,647	604,724	697,234	1,767,378	708,406	609,853	251,427	211,207	205,724
	28	381,743	614,330	356,906	401,957	589,990	498,372	1,572,268	695,386	461,818	249,380	195,042	186,864
	27	347,241	604,640	348,129	367,894	579,308	462,606	1,426,601	678,089	324,806	248,909	189,994	158,798
	26	322,498	604,043	289,731	364,817	573,803	446,497	1,541,945	691,212	432,387	247,160	194,761	141,420
Net working capital.	1930	120,853	473,050	73,470	65,259	93,707	2i6,495	561,893	197,173	197,694	57,089	61,828	63,993
	29	117,749	427,992	105,005	47,569	102,241	143,385	613,079	178,793	232,134	51,545	58,851	85,772
	28	114,594	289,581	49,075	84,824	105,744	145,914	568,339	185,960	120,328	52,955	45,328	82,726
	27	92,974	247,364	72,861	37,259	101,071	102,581	516,396	177,300	105,198	46,131	48,127	81,347
	26	80,036	180,986	43,416	32,750	94,835	118,834	598,395	219,993	110,732	58,485	46,734	89,529
Total common stock equity	1930	335,571	660,341	267,494	293,215	597,954	676,035	1,264,602	578,581	429,503	116,674	177,749	218,245
	29	331,236	710,178	288,870	273,253	591,624	648,590	1,232,472	554,519	445,090	111,739	179,567	188,238
	28	289,172	581,232	253,436	274,425	575,964	461,462	1,099,069	542,376	369,348	91,116	159,585	166,175
	27	253,712	570,810	247,041	237,201	566,644	407,639	1,015,958	522,641	291,540	81,868	156,330	147,027
	26	242,653	570,428	251,701	233,342	557,736	402,836	944,188	527,677	292,813	83,782	162,123	133,671
Gross revenues	1930	257,200	92,609	.....	183,921	.....	457,106	1,381,879	.....	188,812	134,387	88,975	.....
	29	272,413	126,844	.....	199,268	.....	.....	1,523,386	.....	213,262	175,923	88,864	.....
	28	260,336	103,754	179,195	183,565	.....	.....	1,302,779	.....	196,234	162,235	85,368	.....
	27	246,316	102,488	140,326	168,814	.....	.....	1,256,505	.....	141,126	153,098	80,273	.....
	26	257,718	102,791	149,439	191,738	.....	.....	1,283,555	.....	166,174	126,776	79,944	.....
Net for stocks	1930	10,625	90,836	d5,096	†19,634	37,675	46,371	42,151	b40,246	15,073	8,751	9,605	20,393
	29	44,490	126,471	17,573	16,599	46,633	78.500	120,913	38,751	48,318	14,001	15,020	35,767
	28	36,325	103,368	20,395	13,447	46,084	77,337	108,486	39,645	45.074	14,133	11,102	37,659
	27	13,708	101,979	11.345	5,391	40,211	30,132	40,423	11.415	20.029	5,346	10,048	25,559
	26	35,089	101,596	31.519	17.648	55.122	55.099	117.652	32,776	36.043	9.711	11.832	24,134
Earnings per share common	1930	$2.35	17.9%	d$0.56	†$3.01	$2.88	$2.73	$1.65	b$2.25	$1.50	$0.76	$2.19	$3.62
	29	9.83	24.9	1.26	2.82	3.63	§4.66	4.75	2.23	4.90	1.73	3.56	6.96
	28	8.06	24.6	2.04	2.21	3.66	8.33	4.43	2.28	5.34	2.01	2.93	g7.46
	27	3.08	24.4	1.10	0.89	3.19	3.26	1.52	0.67	2.77	0.21	2.65	10.17
	26	7.95	24.3	3.05	3.60	4.38	6.03	5.01	1.95	5.48	1.35	3.12	9.66
Dividends per share common	1930	1.50	17%	0.70	2.00	a2.50	2.50	2.00	1.60	3.00	0.60	f2.00	4.25
	29	1.50	24	1.40	2.75	a2.50	§3.25	1.87½	1.60	3.00	...	f2.00	4.25
	28	1.50	24	1.40	...	3.00	3.50	1.50	1.60	3.00	...	2.00	4.25
	27	1.50	23½	1.40	...	2.62½	3.50	1.50	1.60	c3.00	0,75	2.50	5.00
	26	1.50	23	2.00	...	2.00	3.50	1.12½	‡1.50	3.00	0.60	2.00	5.00
Book value per share common	1930	74.16	1,310fl.	20.45	47.66	45.64	39.85	49.55	32.41	43.60	20.33	40.53	38.79
	29	73.33	1,408	21.72	50.05	46.06	§38.49	48.49	31.91	45.19	20.09	42.59	36.62
	28	63.80	1,400	25.34	49.90	45.73	49.70	44.89	31.24	43.74	18.78	42.05	g32.92
	27	56.95	1,383	24.70	52.60	44.99	44.16	41.78	30.53	40.38	17.14	41.23	58.52
	26	54.98	1,382	25.17	51.74	44.29	44.09	45.62	31.39	44.51	17.50	42.79	53.49

*Parent company statement in florins—1 florin=40.2 cents. d—Deficit. †Includes non-recurring profit $28,000,000, or $4.55 a share. a—Plus 2% in stock. § Paid 50% stock dividend March 15, 1929. ‡ Statements paid to 1930 were on parent company basis. ‡ Paid 25% stock dividend in 1926. b—Includes non-recurring profit of $16,497,000, or $1.33 a share. c—Paid 10% stock dividend in 1927. f—Paid stock dividends of 4% in 1930 and 1% in 1929. g—100% stock dividend paid April 28, 1928. k—Excluding authorized but unsecured securities. Anglo-Persian Oil Company report is not available at the time of closing for press.

It is in country of this character that the Barco oil wells will be drilled.

Barco Concessions of Colombia

Hazardous Exploration and Baffling Savagery Attended the Prospecting of this Mountainous Jungle Country for Petroleum.

By C. K. MacFadden

Chairman, Bogota Syndicate, New York

COLOMBIA has come into the petroleum limelight through presidential approval of re-establishing the once-cancelled Barco concessions contract, following the recent enactment into law of the new bill designed to encourage further exploitation of the country's oil resources by foreign capital. The author of this article, a petroleum engineer, formerly was chairman of the Carib Syndicate, which owns a 25 percent interest in the Barco concessions, and a director of the Colon Development Company. He personally participated in the exploration work, and knows the Colombian jungle as well as any white man, so the story comes first hand to our readers.

CURRENT South American cables carry the long awaited news from Colombia that the legal controversies relating to the famous "Barco Concession" are practically terminated; that the American oil companies interested are soon to proceed with the further exploration of this vast area.

The adjoining lands in Venezuela, are now supplying a substantial part of the world's requirements of petroleum, and many are the predictions that from this undeveloped portion of Colombia great additional reserves of high grade oil will be made available.

C. K. MacFadden

From whatever angle this new exploration and development is viewed, especially by an industry already oversupplied with oil, the fact remains that for the explorer "on the know" few other localities are as vividly identified with tales of romantic endeavor, hazardous exploration, baffling savagery of the Indian tribes and the many legends of mystery that surround the "Motilone" section of Colombia, South America.

It seems incredible to stay-at-home citizens that within a distance of ten days' travel from New York is a large section of country, buried in jungle growth which has never been explored nor even mapped! A country which is still inhabited by a fearless and intrepid Indian population, estimated to number several thousand, which for centuries has effectively blocked all effort to place it under military or governmental control: Indians whose primitive wooden bow and arrow armament has taken deadly toll of every advance against them. But, missionaries of Colombia and Venezuela, aided by semi-civilized Indians, have penetrated the outer jungle of the "Motilone" country.

This section of Colombia comprises some 10,000 to 15,000 square miles on the most northern spur of the Eastern Andean range. The elevated area is the dominant factor which determines the watershed of the Magdalena river to the West and the great Maracaibo basin to the East. These mountains are known locally as the "Mountains of the Moti-

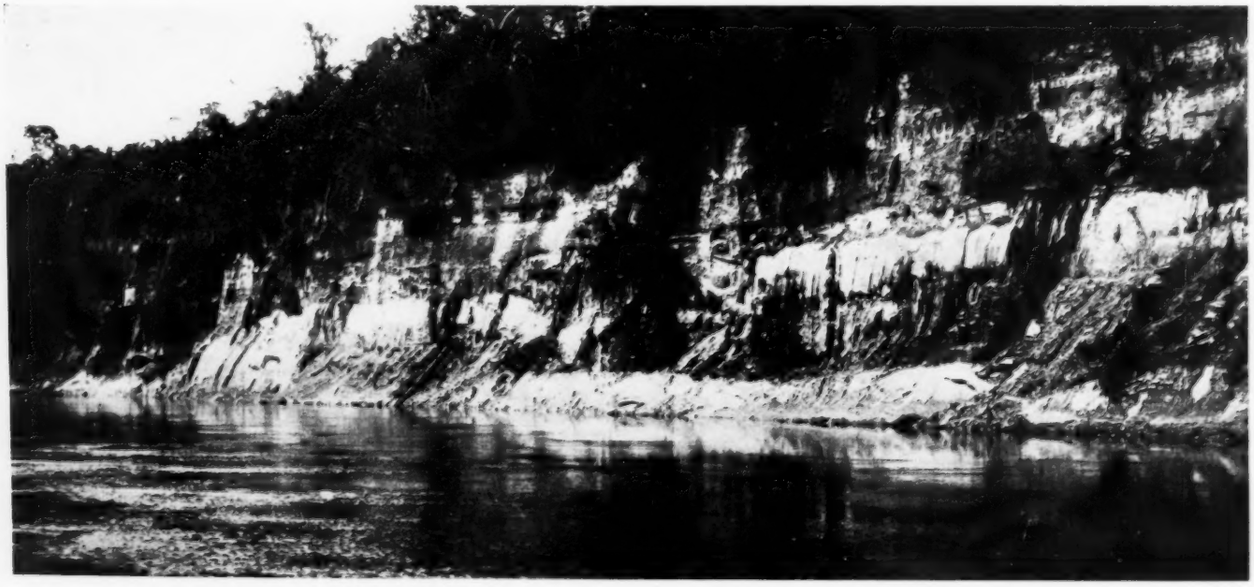
Typical Motilone jungle country in the heart of the Barco concession. Note Indian villages.

lones." Its topmost peaks, unnamed and unmarked on any map, for many miles define the international boundary line between Colombia and Venezuela. Its jungle-covered, cloud-capped heights for 200 miles north and south, and as much as 75 miles east and west, mask a land of mystery, dominated by many small but active bands of savages. Its tumbling mountain torrents pour their crystal waters into the Catatumbo river, which discharges into Maracaibo Lake. The absence of trails or roads or maps, the mantle of dense tropical jungle which for weeks-on-end lie buried in cloud and fog, the intensive electrical storms and heavy rain fall which accompany them, combine with the Indians to keep the adventuresome explorer outside the door, and to reserve this section to its original inhabitants.

Governments of both Colombia and Venezuela have in recent years surveyed a portion of the area along the boundary line between the countries by means of airplane, but that is as far as their explorations extend.

Baron von Humbolt, in 1807 describes as the "Lights of Catatumbo" a mysterious flashing glow which at night covers this mountain section and was used by the local mariners of the Caribbean to steer them on their course. No doubt this light is caused by the almost incesant lightning flashes which, during certain seasons of the year, accompany the downpours of rain. The explanation of the phenomena is obvious: the strong northeast trade winds, heavily laden with moisture, sweep up the eastern flank of the mountains and, cooling in the higher altitudes, produce ideal conditions for an almost continuous electrical display of unexampled magnificence, visible for many miles. [They can be seen almost any night during some months from Maracaibo, and we have personally seen them.—EDITOR.]

It is but natural that a man of scientific mind and venturesome disposition would be intrigued with such general conditions, and such a man was more than exemplified in General Don Virgilio Barco, recently deceased, a prominent citizen of Cucuta, Colombia, who had lived within a day's travel of the Motilone country for many years. He was a vigorous man of keen intelligence, largely self educated but well trained in the fundamentals of scientific knowledge.



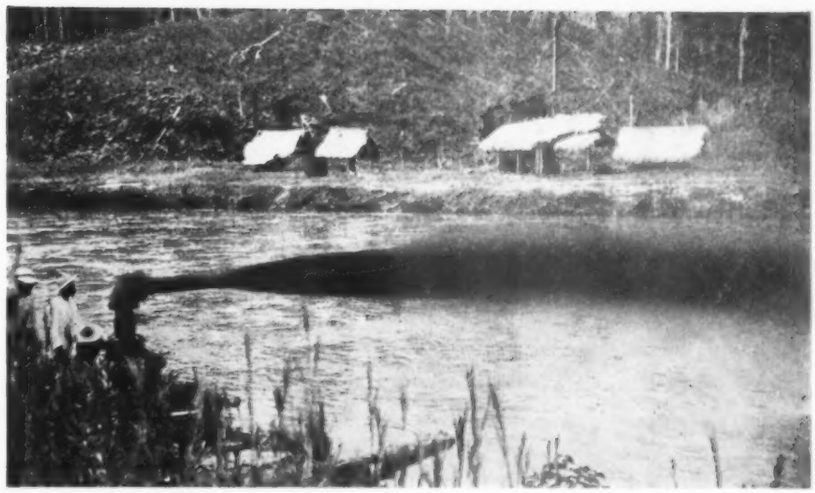
Ideal exposure of stratified rock formation on Rio del Oro river.

His fearlessness and outstanding physical courage were well displayed in the series of personal explorations made by him in this part of Colombia and Venezuela.

General Barco's financial resources were such that he did not need the assistance of others in his earlier investigations so that, in 1905, after a series of most hazardous expeditions in the land of mystery, he applied to the Colombian Government for a petroleum development concession on approximately 1,300,000 acres. The concession was granted and he vigorously applied himself to the more detailed exploration of the area.

He soon found a remarkable group of "oil springs" deep in the jungle, somewhat similar to those near Oil City, Pennsylvania, where the first commercial oil production in the United States was obtained. He secured samples of the oil and sent them to the United States to be tested. The oil was found to be of good quality and easily refined. General Barco then consulted with one of the leading petroleum authorities of the United States as to the design of a small refinery capable of being transported by pack animals through the jungle to the Barco oil springs.

This little refinery was located near a small stream where water could be obtained for the necessary refinery operations and distant about three miles from the largest oil spring which was found to be capable of yielding more than 16 bbl. per day. The refinery had a capacity of but eight bbl. per day of refined oil, and a ready and profitable market for this limited amount was obtained. The products, gasoline, kerosene and fuel oil, had to be transported in a most primitive manner over lengthy and dangerous trails to the nearest settlements.

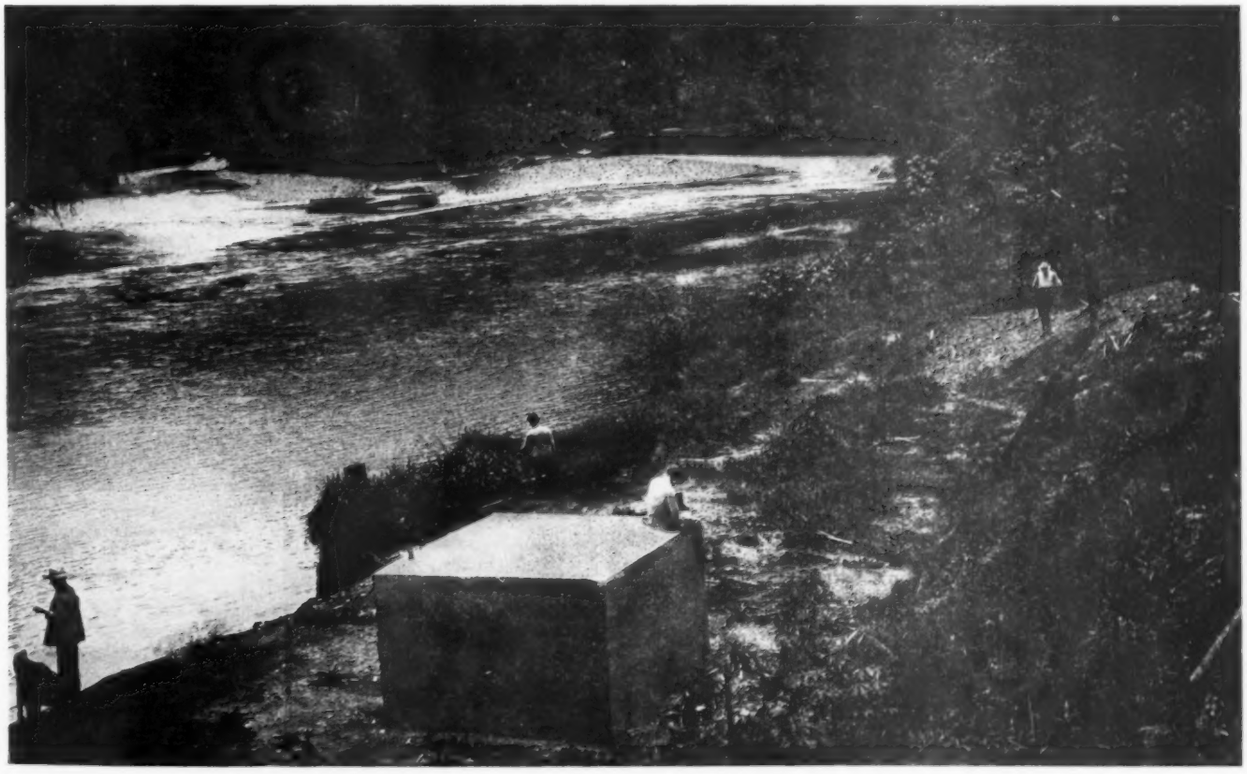


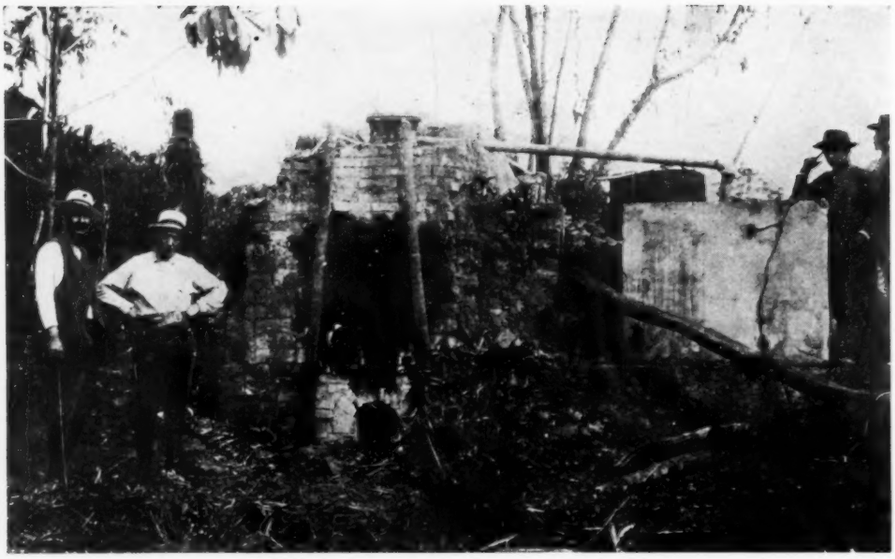
Crude flowing from the Colon well; the Barco well is across the river; depth, 890 ft.

The concrete enclosed Colon well in Venezuela looking towards the Barco well in Colombia just across the Rio del Oro.

To supply the refinery the crude oil was dipped out of the largest spring, which he called "The Well of the South," placed in small kegs strapped to a pack animal and thus taken to the refinery.

Early in the development of the little industry at the camp in the jungle, now known as "Petroleo," General Barco found that he could obtain his entire requirements of crude by digging a few pits ten or twelve feet deep, and in this





First refinery in Colombia, 8 bbl. daily capacity; located on the Barco concession.

manner the first refinery of Colombian petroleum was maintained with an oil supply. As his marketing programme progressed, strong opposition developed and a Venezuelan embargo cut him off from much profitable business. Additional capital was urgently needed. He came to New York for assistance and advice.

In demonstrating the value of his concession he had expended more than $100,000 of his personal fortune, and then sought the cooperation of American capital to enlarge and expand. Some of the Americans to whom General Barco presented his situation could not visualize its possibilities—his Spanish description of the area, when translated by the interpreter brought out many problems entirely foreign to any oil field previously developed by American capital. One of the major American oil companies had just terminated its support of an oil venture in Colombia, which was all but disastrous in result. Few capitalists of venturesome disposition were at all familiar with Latin American affairs. To add to General Barco's difficulties, Colombia at that time had a strong anti-American sentiment shared by many of its prominent citizens and public officers due to the Panama Canal incident, then unsettled.

The General received scant encouragement; but, with a tenacity of purpose most commendable, he spent months in New York and Pittsburgh among the members of the oil fraternity whose practical experience was so essential to his success.

He finally reached a group already interested in Colombian exploration known as the Carib Syndicate. He learned that an inspection of the property and a study of its geological conditions were among the first requirements of his American associates. A carefully planned expedition of exploration was arranged and its five American members met General Barco at Maracaibo, Venezuela, a few weeks later, where the finishing touches were applied to its small but efficient equipment. A shallow-draft steamer carried the party to Encontrados, a small Venezuelan port on the Catatumbo river near the last fringe of civilization that the party would see for many days. Large canoes furnished means of transport beyond Encontrados.

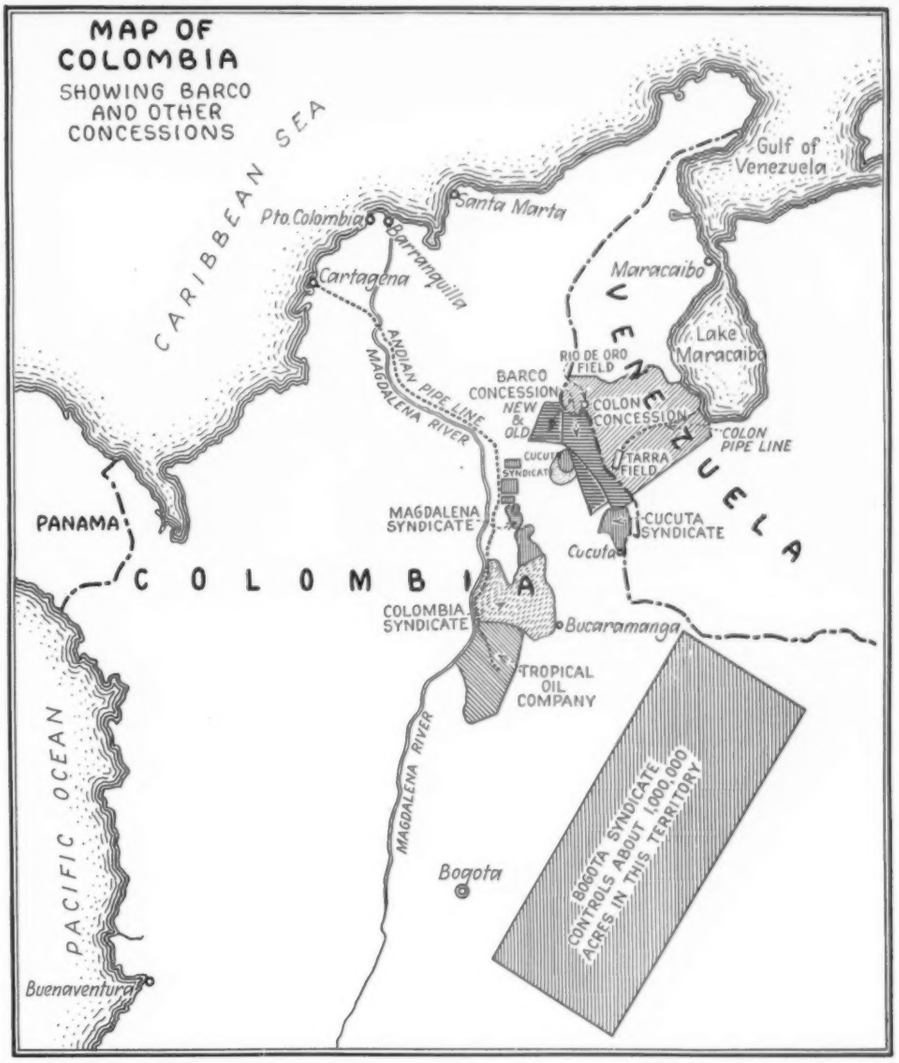
General Barco's reputation as a fearless and competent leader was so well known that through his efforts some twenty robust and experienced rivermen

Oil pit No. 2 (before clearing), on the Barco concession. Note our armed guard.

were enlisted to accompany the party. These men expected to furnish the motive power to stem the strong current of the river, as well as furnish protection from any roving bands of Motilone Indians which might be encountered in the heavy forests known to fringe the river beyond the Colombian frontier.

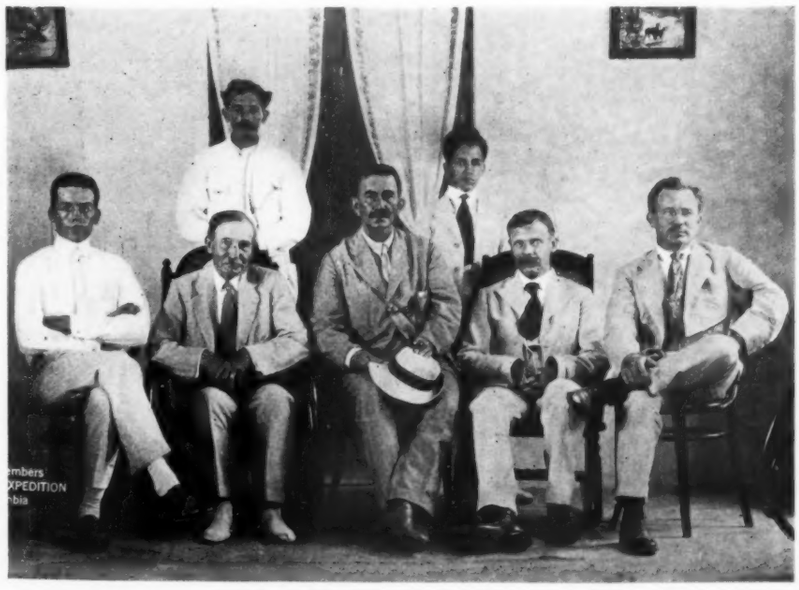
The Catatumbo river was at normal stage some three hundred feet in width and average channel depth of five or six feet. The larger of the three boats carried the bulk of the expedition equipment, which included five American-made outboard motors of about five horsepower each. Three of these motors were attached to an improvised platform extending from the stern of the larger boat, and proved of great value in negotiating the many miles of river travel. Needless to say the "bongo-men," who otherwise would have had to pole the boats, were most enthusiastic at this unheard of innovation.

Several days' travel up the Catatumbo found the expedition at the Colombian frontier, where a clear swift stream of good depth, the Rio de Oro, or River of Gold, flowed in from the forests. Its banks were in many places flanked with cliffs of varied colored sandstone on which towering cedars and mahogany pushed upward through the tangle of jungle growth. Monkeys and parrots were in evidence. Native wild turkeys and water fowl furnished fresh meat



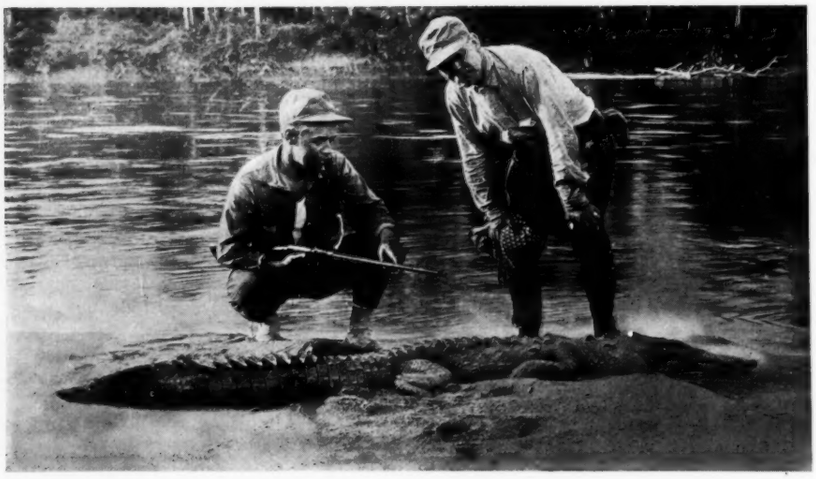
Carib Syndicate exploration party in Colombia

Left to right (seated): Dr. J. B. Burnett, now chief geologist, Lago Petroleum Corporation; W. E. Griffiths, H. L. Doherty and Company; General V. Barco; George R. Du Buis; and Mr. Fife. (Standing) the guide and Jose Murrillo, now government petroleum inspector at Maracaibo, Venezuela. The author took the photograph.



for the party. Gravel bars at each bend in the river gave frequent excuse for a general foraging expedition by the boatmen in search of crocodile eggs deposited some 18 inches from the surface, in "nests" by the wily Silurians and left to hatch from the sun's heat. As many as 50 or more eggs were found in each nest, and although many were far advanced toward delivering their lively contents in their solar incubator, the evident relish with which the eggs were consumed by the natives left nothing to the imagination as to their edibility.

As for crocodiles to be seen on every sunny sand or gravel bar, it was noticed that they showed little or no fear of man, a circumstance that acted as a great deterrent to any aquatic exhibitions on the part of the swimmers of the party except under the most favorable conditions. On the first day's travel up the Rio de Oro the geologists found a prominent anticlinal fold plainly exposed by the river's erosive energy. They noted an active ebbulution of natural gas and many globules of oil rose through the clear waters which promised rich re-



Sport paradise for oil men. The author (with the rifle) and W. E. Griffiths of H. L. Doherty & Co.

turns from drilling operations. At this point a well was later drilled on the Barco lands. The explorers also found thick beds of bituminous coal in a ravine nearby, a total of more than sixteen feet of good coal being exposed within a short distance.

A well guarded camp was established by the prospecting party at this point on the river and although well within the areas frequented by the savages, no Indians were seen. A large jaguar fished in the moonlight from a rocky river ledge nearby one night and for a time his activities were mistaken for Indian preparations to attack the camp.

After careful examination of the Rio de Oro section, the downstream trip into Venezuela was quickly made and the party then ascended the Rio Zulia, another large tributary of the Catatumbo, having its headwaters in Colombian territory. At the river port of Villamizar, Colombia, near the international line, the party abandoned river transportation and, astride sturdy "hayburners" cut through the jungle to the site of the small Barco oil refinery. It was found that the Indians had burned all but one of the buildings, and had destroyed the little banana grove and corn field nearby.

Although safely hidden in jungle, the presence of the savages was quickly evident and the efficient and accurate use of their bows and long arrows of black-palm soon put the camp on a war footing. In spite of sentinals and numerous guards many arrows were shot from the dense jungle at members of the party. One of the advance guards venturing a few hundred feet from the camp was killed by an arrow driven through the chest, another arrow broke a collar bone and shoulder blade. Even a pet dog of one of the guards received the business end of one of the 5½ foot arrows through a hind leg. Repeated fusillades through the jungle at the absolutely invisible savage enemy tended to hold them at a respectable distance. It was with a sigh of relief that the party retraced its path back to civilization but only after having fully confirmed all of General Barco's representations made in New York.

Up to the present time the only well that has been drilled on the Barco lands by the Colombian Petroleum Company (Gulf-Carib interests) is one located several days' travel up the Catatumbo River. This well is located on the bank of the Rio de Oro directly opposite a well of the Colon Development Company, the later being on the Venezuelan side. [The story of the Colon property development was published in WORLD PETROLEUM, March, 1930, issue.—EDITOR] The Colombian well is located on the crest of what is known to American geologists as the 'Oro anticline,' which has been traced for a distance of 40 miles by airplane reconnaisance. It extends well into the District of Colon, Venezuela. Drilling by the Colon company has disclosed several prolific producing horizons on its property on the Venezuelan portion of the fold.

The well on the Barco portion of the anticline in Colombia was drilled to a total depth of 890 feet. A good showing of heavy black oil was found at 360 feet, and at 440 feet a flow of lighter oil was found in sandstone formation with a considerable flow of gas. On a preliminary test—no tankage was available—the well was estimated to be good for 1500 to 1800 bbl. per day. The derrick was removed and the well head concreted over.

At that time an embargo by Venezuela on the importation of additional equipment and machinery was enforced until the Colombian Government established a proper port of entry along the border. This effectively blocked further development by American operators. At a later date the Colombian Government issued a decree for the cancellation of the concession, citing several grounds for its act. The American operators immediately filed suits for the settlement of the matter in the Supreme Court of Colombia.

The transfer in 1917 of General Barco's concession to a Colombian operating company, which in turn was owned by an American holding company known as the Colombian Petroleum Company of Delaware, terminated the General's financial burdens. He received his "out-of-pocket" expenditures and as his profit a participation in future returns in the form of 15 percent royalty. Before his death he assigned his royalty interest to a company having one hundred shares of capital and in his will bequeathed these shares or units of participation to

Seepage at Pozo del Sur. Capacity 16 to 25 bbl. per day. Note the gas bubbling.

his various heirs and beneficiaries. There has been some activity in trading in these royalty shares, some having been sold at more than $25,000 each. At present the American Maracaibo Company is the largest individual owner of these royalty participations, although the Barco family still own substantial interests.

The Colombian Petroleum Company, now owned jointly by the South American Gulf Oil Company and the Carib Syndicate, Ltd., will conduct the actual drilling operations on the concession. The expenditures on the property by the Colombian Petroleum Company are expected to exceed $25,000,000 and will constitute the major industrial development of that portion of Colombia.

From the date of the transfer of General Barco's concession to the Colombian Petroleum Company until the recent settlement of differences between the Colombian Government and the American operators, there have been a series of delays and misunderstandings which have caused all parties at interest to resort to the courts for protection.

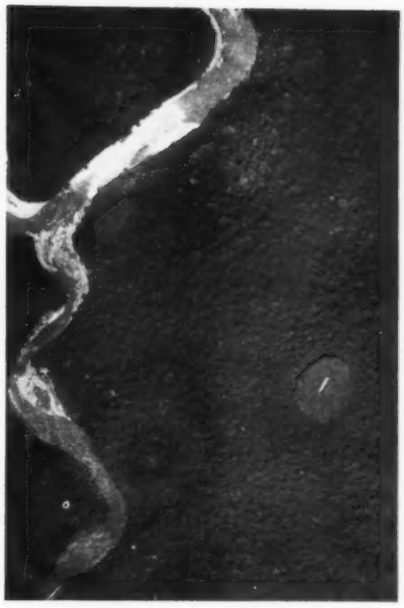
The negotiations of long standing have finally arived at an amicable settlement, and it is firmly expected that before the end of the year active progress will have been made toward intensive development of the area.

The adjacent Venezuelan land is already under active production development by the Colon Oil Company owned by Royal Dutch and Carib Syndicate interests and a new pipe line is taking more than 20,000 bbl. of oil running about 32 degrees Beaumé per day to market from the property.

The Motilone Indian menace has largely disappeared from this particular portion of Venezuela, as is also the case with the Barco lands of Colombia immediately adjacent across the international boundary line. It is probable, therefore, that the first development will take place near the Venezuelan line.

According to the advices from Colombia and a study of the terms of agreement finally accepted by the President of Colombia the Gulf interests are to construct pipe lines of large capacity to the Colombian coast, some 250 miles distant. They will also expedite a survey of the area and after geological examination in detail, select 500,000 acres for actual development.

The Colombian Petroleum Company will be required to build roads and numerous bridges and maintain a development organization in which many Colombians will find employment. The



Motilone community house can be seen in clearing in jungle.

money value to Colombia eventually will total millions of dollars and is expected to greatly stabilize many of the country's financial problems.

Eventually the Gulf, Carib and American Maracaibo participations should yield large returns in which the Colombian heirs of General Barco will share.

Among the Americans who have had much to do with the Barco area should be mentioned H. Case Wilcox who headed an expedition across the Andes from the Magdalena Valley into the Maracaibo basin. The Wilcox expedition, which attracted much attention due to the fact that it traversed an area hitherto not known to the outside world, was for the purpose of locating if possable, a pass across the mountains suitable for a wagon road or pipe line. Wilcox made this trip through the Andian country in less than 30 days and came through without losing a man.

He found that a feasible pipe line route through a pass of about 5,000 feet elevation above sea level was possible.

The first airplane to be sent to Colombia was expected to remain in contact with the Wilcox expedition, but unfortunately it arrived in Colombia too late to be of service. William M. Schaill, now associated with the Gulf Interests, was one of the first of the American group to visit the Barco concessions with General Barco.

▼

U. S. Motor Fuel Consumption and Taxes in 1930

State	Cents per Gal. Tax	Tax Receipts	Barrels of Gasoline
Alabama	4	$ 6,901,492	4,108,030
Arizona	4	2,670,019	1,589,297
Arkansas	5	6,427,273	3,060,606
California	3	34,870,126	27,674,703
Colorado	4	6,144,826	3,657,634
Connecticut	2	4,515,063	5,316,586
Delaware	3	1,013,357	804,251
Florida	6	13,655,175	5,405,641
Georgia	6	13,435,062	5,313,920
Idaho	5	2,730,862	1,295,780
Illinois	3	27,472,420	21,803,508
Indiana	4	17,158,834	10,213,539
Iowa	3	10,584,068	8,400,054
Kansas	3	9,120,491	7,238,485
Kentucky	5	8,414,733	4,007,016
Louisiana	5	7,546,448	4,399,566
Maine	4	4,168,890	2,446,129
Maryland	4	6,991,188	4,161,421
Massachusetts	2	10,562,947	12,574,937
Michigan	3	21,713,489	17,201,491
Minnesota	3	10,359,111	8,221,517
Mississippi	5	6,917,575	3,233,895
Missouri	2	8,639,161	10,284,716
Montana	5	2,941,879	1,400,895
Nebraska	4	9,060,422	5,393,108
Nevada	4	675,012	401,793
New Hampshire	4	2,499,478	1,487,784
New Jersey	3	11,380,231	13,016,312
New Mexico	5	2,761,887	1,294,896
New York	2	28,476,290	34,251,969
North Carolina	5	12,533,454	5,968,312
North Dakota	3	1,971,986	1,562,939
Ohio	4	37,681,451	22,072,292
Oklahoma	4	12,092,420	7,197,869
Oregon	4	6,198,777	3,690,155
Pennsylvania	3	33,623,510	22,115,298
Rhode Island	2	1,735,747	2,062,214
South Carolina	6	7,145,711	2,835,044
South Dakota	4	3,503,882	2,085,644
Tennessee	5	10,719,195	5,104,379
Texas	4	29,527,098	17,575,654
Utah	3½	2,105,529	1,431,853
Vermont	4	1,879,921	1,119,000
Virginia	5	10,775,058	5,130,980
Washington	3	7,253,249	5,756,547
West Virginia	4	5,367,078	3,189,660
Wisconsin	2	8,314,841	9,898,620
Wyoming	4	1,447,005	861,312
Dist. of Columbia	2	1,599,689	1,904,391
Total	3¼c.	$494,683,410	351,221,642

▼

Drastic competition resulting from overproduction of motor fuel and the fight for gallonage produces scenes like this at this Hollywood service station.

© Acme

Federal Storage of Surplus Crude Oil

Decker Plan for Creating National Reserve by Government Purchase of Surplus Oil Marketed Below Cost. Storage Underground in Depleted Wells.

By Stiles Morrow Decker

Consulting Engineer

WHERE commercially feasible, repressuring and restoring depleted oil fields offers extensive possibilities during periods of overproducton. S. M. Decker, in the interests of national conservation, offers a new plan in this connection whereby the Government shall control restored pools as national reserves, paying the producer with oil bonds issued against the crude. Mr. Decker has been identified with the petroleum industry for many years. Following his graduation from Annapolis he served as a Major in the Air Force during the world war. Later he was field engineer for the Standard Oil Company of Venezuela, and the Carter Oil Company, and was vice-president of the Trinidad Oil Fields Ltd. At present he is active in consulting work, and he is associated with the Sheldon Machinery Corporation.

OVER production of crude is one of the basic reasons for the world crisis facing the petroleum industry. In several countries, notably Venezuela, Dutch East Indies and Persia the output can be and has been controlled, while production has been very materially reduced in the United States during the past eighteen months under proration enforcement. But, the course of action that will best serve to remedy conditions, still far from being satisfactory, is not easily planned or carried out.

Over production from North American fields cannot be stopped arbitrarily at the wells, for no one agency today has the necessary power. As a substitute, every known method of limiting production by agreement and State regulation is being attempted and these efforts have resulted in such cooperative agreements as proration and unitization. State authorities have exerted legal pressure to reduce the flood of oil, and Federal authorities have offered cooperation within existing limitations. All this effort has resulted only in a temporary balancing of production to a point nearer consumption. The balancing of consumption is necessarily temporary because the agreements apply only to present fields; another new field might easily flood the market again as in the case of East Texas. Moreover, the methods used to secure proration are questionable at law, and are therefore vulnerable if attacked by any powerful group dissatisfied with present conditions. Actually, only enlightened self interest on the part of the more progressive of the interested parties has made proration possible thus far.

There is, however, another method of controlling crude oil surpluses, which is surer, safer, and more easily operated than proration, unitization, or other artificial restraints placed on production. An outline of this plan is the purpose of the following specially written article.

Decker Plan

FOLLOWING careful study of the situation, the writer has formulated a plan for the reduction of surplus oil stocks by Government purchase and storage in underground oil reservoirs as a great national reserve. The Government would determine a price at which it would purchase all oil offered for sale when current prices were depressed to the figure set.

Funds necessary to undertake this colossal purchase would be raised by issuing bonds carrying a low rate of interest, perhaps 2½ to 3 percent. These bonds would be secured by the oil reserve, and would be either turned over to the companies as the oil was purchased or sold by the Government and the cash used to pay for the oil purchases, as the financial policy of the administration dictated. In any case it seems probable that such bonds would be a welcome addition to the security market at the present time. Interest on these bonds would be taken care of by appreciation in value of the oil while in storage.

Purchase of a commodity of this nature, by the Government, in an effort to preserve an industry in a critical condition, is not without precedent. The most obvious example is the purchase of wheat by the Farm Board in an effort to lighten the surplus stocks that were depressing the market. Tariffs, and direct and indirect subsidaries that are payed by the Government to certain industries such as aviation, the merchant marine, etc. are all efforts on the part of the Government to assist industries that are believed to be of value to the nation. In the case of oil, the purchases would be held until needed, and not dumped on domestic and foreign markets.

In addition to the Government precedent, the pressing necessity for some action if a vital industry is to be maintained in anything like its present position, and the apparent inability of the industry itself to cope with the situation, partly through being hampered by laws which make illegal the necessary cooperative steps, may be considered sufficient justification for Government interference.

Storage

THE second step in the plan is the storage of the oil. Above ground storage is far too costly and dangerous to merit consideration for vast quantities of crude; but both theory and experiment approve of cheap, safe, under-

ground storage in depleted or semi-depleted wells.

The value of this form of storage has three main aspects; financial advantage, technical excellence, and ease of transportation.

Purchase of storage space in depleted oil wells could be accomplished for a very small sum, figured at cost per barrel. When the market price of crude was depressed to a figure that would permit the Government to enter the market as a buyer the return per barrel of oil would no longer justify operation of many wells from which it was necessary to pump the oil. At present there is practically no market for such property, so under this plan the government is not likely to have serious competition in bidding on the property. Consequently depleted, and often only partly depleted, wells could be purchased at a comparatively low price.

Concerning the tightness of such a container there is little room for doubt. If even a small leak were present the oil would have been lost several thousand years before the first appearance of the human race. Absorption, naturally will not occur as the sands are already saturated. Fire hazard and the consequent heavy charges for insurance would be eliminated while the oil was actually in storage.

There are already a few practical examples of underground storage. In Persia and in California depleted wells are used for storing oil and gas, and in both cases appear to be satisfactory so far. It is, of course too soon to cite these storage tests as proof that oil will not dissipate when stored in wells; but it is an interesting fact that in both cases the oil when removed from the wells has been of higher gravity than when it was stored. This is due, probably, to the fact that the wells in question formerly contained higher gravity oil than that stored in them. This high gravity content mixes with the introduced oil and gas.

It would seem that sufficient proof of the value of the container lay in the fact that oil has been stored in the very same containers for thousands of years.

The problem of transportation to and from the place of storage is solved by the existence of pipelines, at many of the exhausted fields, which could be used for transferring the oil to Government reserves. The proximity of refineries would cause a considerable portion of the transportation charge to be allocated ultimately to refining costs, thereby decreasing the cost of putting the plan into execution.

The only proper charges which could be made against cost of storage would be:

1. Cost of reservoir.
2. Cost of forcing the oil into the reservoir.
3. Lifting charges when removing the oil from the reservoir.
4. Superintendence during storage.
5. Interest on the investment.
6. Cost of marketing bonds, etc.

If the reservoir were an active one in which oil was constantly being stored and withdrawn, the cost of Item No. 1 would be rapidly amortized or else the cost per barrel would be extremely small. Furthermore, if gas were stored with the oil the lifting charge per barrel would be low and by conserving the gas through proper methods it could be used again for repressuring.

Use of Oil

In order to avoid a depressing effect on the market (such as was exercised on the wheat market by the large stores of wheat held by the Farm Board) as well as making the reserve valuable to the nation, it would be necessary to have it well understood that the Government reserve was not to be used except in case of a *national emergency* when insufficient oil was available from other sources. This would give the Government purchases the same effect as actual consumption of an equal quantity of crude resulting in the reduction of existing surpluses.

The advantage of holding a large reserve of oil belonging to the nation is immediately obvious when considered, either in relation to national emergency such as war, or when considered in relation to peace-time industrial development in the future when the oil reserves of the world will be considerably depleted. If the Government is justified in expending large sums of money on reforestation (which it undoubtedly is) how much greater is the justification for establishing a reserve of an important commodity which cannot be replaced by cooperation between man and nature as can a forest. Every barrel of oil taken from the ground is just a barrel less for future generations.

Effect on Petroleum Industry

As has been mentioned before, the purchase of all crude offered below a certain price, would have the effect of disposing of the large surplus stocks acquired by the major companies before the discovery of the East Texas field. Disposal in some way is essential to the life of many of these companies and indirectly is of vast importance to the nation which would suffer considerably if the economic structure, already weakened, received the further shock of the failure of one of the major oil companies with the consequent unemployment, weakening of the stock market, and general financial chaos.

Further, a fixed price at which the Government would purchse oil would serve to stabilize the price with a consequent beneficial effect on the entire industry. The price, of course, would have to be one that would not encourage continuation of the present reckless production of oil, or importation of huge supplies of crude from abroad to the point of detrimental competition with domestic producers.

Relation to the Tariff

The first important effect of the adoption of the Decker Plan would be the disposal of the tariff problem. With this threat out of the way the continuous operation of the refineries on the Atlantic seaboard would be assured. The risk of raising the number of unemployed by the thousands who now earn a living in these refineries would be removed.

On the other hand the market would not to be flooded with oil from other countries, because the price fixed by the Government could be placed low enough to yield no profit for imports and because most of the production in countries other than Russia, in a position to import into the United States is controlled by American companies. The latter naturally would be far more anxious to cooperate with the Government in disposing of the domestic surplus than they would be to defeat the purpose of the plan by flooding the market.

This plan, besides its other advantages, would avoid the injustice that a tariff would work on American capital invested in operations abroad.

Storage vs. Proration and Unitization

The important difference between the Decker Plan and proration or utilization is that under the first system the quantity held is known and the ownerships determined. Most of the difficulties of proration or unit operation arise from the fact that the quantity and ownership of the oil is indeterminate. Surface rights only determine the position, in relation to the container, from which

(Continued on page 385)

Developments in Fractional Distillation

C. H. S. Edmonds Discusses Recent Progress Before British Institution of Petroleum Technologists in London.

Review by Dr. O. W. Willcox

THE introduction and rapid progress of fractional distillation in oil refining, which has occurred within the past few years, has again proved that the fundamental principles of chemical engineering are the same for all branches of chemical industry. Continuous fractionation in column stills long ago made its appearance in the alcohol industry; vacuum evaporation and the principle of vapor flash are more than a century old, and were used in various ways long before the petroleum technologists had much conception of anything better than a shell still.

But, as C. H. S. Edmonds shows in his discussion of recent developments in fractional distillation, petroleum technologists have become thoroughly alive to these old principles and are using them to accomplish what the old timers would regard as marvelous results.

The principle of flash distillation as now applied in oil refining, as Mr. Edmonds explains it, is simplicity itself. Crude oil is merely heated in a confined space to a temperature considerably above the temperature at which the most volatile constituents of the crude would boil under atmospheric pressure. The oil having reached this temperature it passes through a narrow opening into the middle chamber of a bubble tray tower still. The volatile portions instantly flash into vapor and ascend the tower; those constituents with the higher boiling points, like gas oil, are the first to condense on the trays; above these, the kerosene fractions assume liquid form, and higher still the gasoline fractions.

All these fractions make their way downward to separate exits and are continually meeting ascending vapors that strip them of all lighter products, the principle of refluxing being utilized to the full. That part of the hot oil which did not flash into vapor in the middle chamber drops through a series of trays; in its descent it meets an ascending current of superheated steam which strips it to desired specifications of flash point, viscosity, etc. In this way a Pennsylvania-type paraffin base crude is reduced to specification cylinder stock, gasoline, naphtha, kerosene, gas oil and pressable wax distillate, all in one operation without any serious cracking as evidenced by higher flash points, viscosities, and color. Throughput and output of salable products are increased and costs have been reduced as much as 50 to 60 percent in comparison with old shell still practice. Crudes with more or less asphalt base may be given a more elaborate treatment, being first processed as above to recover and separate the more volatile products. The stripped crude is then superheated in a similar manner and flashed into a tower wherein a relatively high vacuum is maintained, whereby heavy gas oil, pressable wax distillate and cylinder stock are effectively fractionated from the asphalt flux residue. An important point is that cylinder stocks can be produced with negligible asphalt contents.

The main portion of Mr. Edmond's paper is concerned with advances that have been made in the constructive details and operation of tube stills and fractionating columns. The modern tube still, in which crude oil is superheated, contains two banks of tubes. The first bank is placed in the path of the relatively cooler combustion gases from the furnace, where the oil absorbs heat up to about 400 deg. F. After this preliminary heating the oil flows on through the next bank of tubes located across the roof of the furnace, where it absorbs the radiant heat of the fire, by which its temperature is raised to 700 or 800 deg. F. The all important point in the new designs of the tube still is to dimension the pipes so that the volatile products will all be heated above their vapor points just as the continuously flowing oil reaches the far end of the bank. It is essential to obtain turbulent flow of the oil in the tubes to avoid local overheating and to obtain efficient heat transfer. This involves high friction losses, but these are reduced by using streamlined manifolds.

Concerning progress made in the fractionating end, the most striking development is the steady increase in the diameter and height of the column. In order to obtain flexibility of operation when called on to process a variety of crudes and to produce a large number of special fractions for blending purposes, the refiners are building towers 130 to 140 feet and higher. Diameter has kept pace with the height; at present the record appears to be a height of 155 feet and a diameter of 20 feet. One such still in Texas, operating on mid-continent crudes at the rate of 14,000 bbl. a day, produces nine products in one operation, namely, gasoline, naphtha, kerosene, and light gasoil in the atmospheric stage, and heavy gasoil, wax distillate, heavy wax distillate, cylinder stock, and flux bottoms in the vacuum stage. An interesting development in processing the heavier residues from the two stage process is the "vacuum flash jug," which is a simple tower with baffles above and trays below the inlet, and in which the residue can be treated at a higher vacuum than in the vacuum tower of the two stage unit.

The use of vacuum distilling equipment for the processing of reduced crudes to produce wax distillates, lubricating oils and specification asphalts, states M. Edmonds, is becoming daily more extensive. Not only so, but the use of a second vacuum stage to do the work formerly carried out by the lower sections of an atmospheric fractionating tower running a crude to flux bottoms is becoming more widespread.

The reason is not far to seek. The advantages of processing heavier fractions of a crude under vacuum are briefly these:

1. Reduction of flash temperature.
2. Consequent elimination of the tendency to crack heavy lubricating and asphalt fractions.
3. Consequent elimination of cracked products from the light distillate products whose color stability is of importance (e.g., gasoline and kerosene) which also means elimination of gum forming constituents.
4. Considerable improvement in quality of lubricating oil fractions.
5. Ability to run to lower percentage bottoms.

Venezuela Views Her Petroleum Affairs

Production During 1930, and Petroleum Operation Problems Which Have Lately Arisen, Discussed From the Venezuelan Angle.

By a Caracas Contributor

Caracas, Venezuela.

NOTWITHSTANDING the self-imposed system of restriction established by petroleum companies in Venezuela in order to make a profitable showing in the difficult period the industry has been passing through, oil production in this country maintained itself at a normal level during 1930. This tends to indicate that exploitation is in stationary condition. Two well-marked advantages have resulted: one, that of maintaining Venezuela in a prominent position as a petroleum producing country, the other, that of preserving, even with a certain increment, fiscal collection.

In 1929, crude oil production was 136,914,653 bbl. and in 1930 it reached 141,077,388 bbl., or a favorable balance of 4,162,735 bbl.

If in general the companies did not show great activity, there were at least two who increased their production, namely the Colon Development Company Ltd., (Royal Dutch-Shell) in the state of Zulia, and the Standard Oil Company of Venezuela, (New Jersey Standard) in the State of Monagas. Moreover, during the year, the following eight new companies were registered: The Bescol Oil Corporation; Compania Espanola de Petroleos; Delta Petroleum Company; Société de Prospection de Petrolé et de Mineraux; South American Oilfield Inc.; Coro Petroleum Company; Falconian Petroleum Corporation, and Venbar Oil Lands Corporation.

Collection of Levies

IN previous years levies, or imposts, were liquidated and collected as the product was exported or utilized within the country. A ruling issued on August 7, 1930, directed that the liquidation of levies on production of oil for each month should be made within the first 15 days of the following month.

The old practice, in fact, was irregular because as these levies are established on production, it is only just that they should be liquidated and collected immediately upon the extraction of the mineral. It was further observed, that extended carrying of petroleum in storage without the levy paid, placed the Government in danger of incurring loss of the levies, in the event of the oil being destroyed by fire, leakage, evaporation, and other causes.

This new procedure has been strictly complied with since December of last year, during which month the levies on all petroleum exploited during the previous month were paid, plus those pending on petroleum in storage at the beginning of the same month, which amounted to 6,772,277 bbl.

UNTIL September, 1930, Venezuela production ranked second in importance only to the United States. Due solely to voluntary curtailments by oil companies in Venezuela, Russia was able to jump ahead; even then the Soviet's total output of crude for last year was over 11,000,000 bbl. less. At any time this South American country could easily exceed present Russian production, and her position on the map is far more strategically situated to the world's markets. Consequently it is not surprising that Venezuela is taking very seriously the exploitation of her vast petroleum resources and the problems which arise, as will be understood from this article giving the Venezuelan viewpoint.

A Case for Litigation

THROUGH information furnished by the Technical Inspector on Hydrocarbons, of Coro, dated September 22, 1920, the Ministry of Fomento became aware that the Compania Tocuyo Oilfields of Venezuela Ltd., was operating a refinery. This refinery was supplying its own petroleum products to the company's field equipment, consisting of trucks, automobiles, pumps, launches, etc.; that it was selling gasoline to private individuals upon request, at 0.48 bolivar per liter; that truck contractors were being paid in part on their contracts in gasoline figured at the above price.

The Ministry of Fomento considered that this oil company had no right to practice petroleum refining in this country, because no concession had been especially obtained by them for that purpose. Neither has any permit been granted to them on their contract of July 3, 1907, which permits exclusive exploitation, for a period of 50 years, of all asphalt, petroleum, bitumen and tar mines in the District of Acosta and Zamora in the State of Falcon, and in a district of the State of Lara, from the left margin of the Tocuyo River. This contract is cessionary in conformity with the terms of the transfer made to the Tocuyo Oilfields by the North Venezuelan Petroleum Company Ltd. on December 31, 1928. Moreover, in consequence of the transaction entered into by the two companies on February 23, 1927, the refining activity of Tocuyo Oilfields is illegal even under the old Venezuelan mining law of 1910.

Consequently, the Federal Executive notified Tocuyo Oilfields Ltd. through the Minister of Fomento. In the company's reply to two notes addressed to them on this subject on November 13 and December 5, 1930, far from paying any active attention to the suggestions contained therein, they sustained their

Mene Grande, Venezuela.

Union Oil Company of California preparing to drill Yocil No. 1 in the district of Urdaneta, state of Zulia.

Photo. Pan American Airways, Inc.

opinion that they considered themselves entitled by the said contract to refine petroleum.

The means of an amicable understanding being thus exhausted, it became necessary to discuss the case judicially. To this effect a note of instruction was handed to the Attorney General of Venezuela, dated February 11, 1931, who entered the claim on February 24.

Reduced Production

THE Minister of Fomento in a statement preceding the report of his department, mentions that petroleum companies have reached an agreement to reduce production of Venezuelan petroleum by 25 percent, more or less. But, he adds, it is to be expected that by securing additional markets they may be able to make certain adjustments, and so possibly return to the same production as in 1930 and to continue expanding exploitation work.

Customs Duty Exemption

EXEMPTIONS from the payment of import taxes granted to petroleum exploitation companies in our country during the fiscal year of 1930 amounted to 37,699,-710.20 bolivar ($7,539,942) compared with 62,787,357.74 bolivar ($12,557,471) in 1929.

Motor Fuel Prices

THE report of the Ministry of Fomento states that in view of the fact that the exemption from tariff payment granted to exploiting companies represents decided and efficient collaboration towards successful operation of oil companies, the government has taken

Constructing derrick foundations in Lake Maracaibo.

into consideration the high sales price of gasoline for domestic consumption. The DESPACHO DE FOMENTO, after a careful comparative study of the prices of gasoline in other countries where gasoline from Venezuelan petroleum is sold far cheaper than in Venezuela, approached the various producing companies, and one importing company, with a view to obtaining a fair reduction in the price of this important commodity, which today is vital to industry and commerce in general. It is more than demonstrated, it is stated in the report, that gasoline from our petroleum can be produced in the United States, shipped to Venezuela and sold with a margin of profit; the same can be done with gasoline from Trinidad, notwithstanding the additional tax of 30 percent on imports. It is scarcely just that Venezuela's gasoline, which pays a domestic consumption tax of about 0.003 bolivar per liter, should be sold more cheaply in countries where the tax is higher.

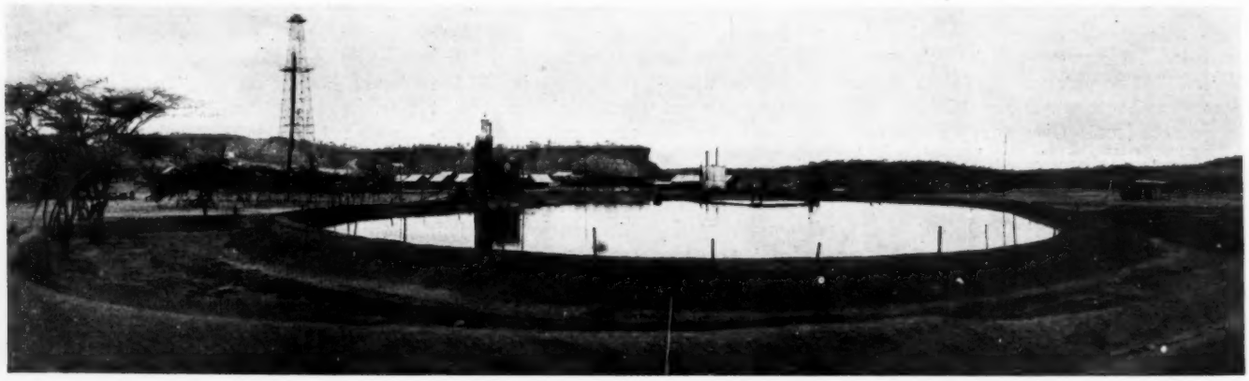
In the opinion of the Ministry, gasoline should be offered for sale at a lower price than 0.45 bolivar per liter, now current in Venezuela.

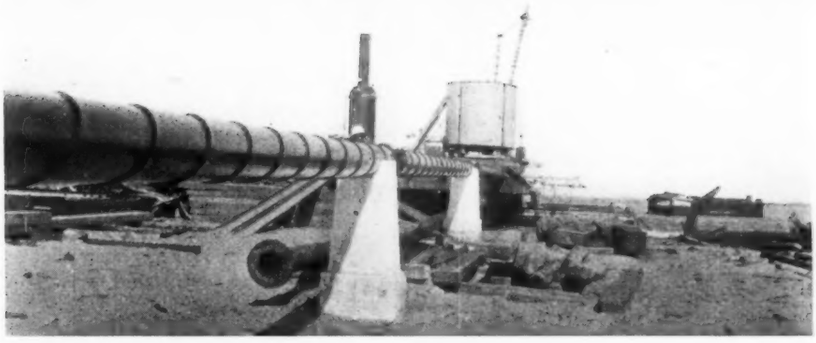
To the reasonable action taken by the Ministry of Fomento, the West India Oil Company; the Lago Petroleum Corporation, and the Caribbean Petroleum Company have responded, the last two mentioned having made a reduction of 0.05 bolivar per liter.

Venezuela consumes around 6,000,000 liters of gasoline per month, which at

Earthen storage built by Richmond Petroleum Company (S. O. of Calif.) for holding test flow from Well No. 1-A.

Photo. Pan American Airways, Inc.





Loading line at sea terminal, Chichirivche, of the new pipeline of the Tocuyo Oilfields Company.

0.45 bolivars, totals 2,700,000 bolivars ($540,000). It should be taken into account however, that prices vary according to localities from 0.45 bolivar up to 1.00 bolivar per liter. Consequently Venezuela, a petroleum producing country, pays higher prices for gasoline than certain other non-producing countries.

Technical Inspectorships

NEW hydrocarbon inspectorships have been functioning since August, 1930. Through them the provisions of the Law on Hydrocarbons and other Combustible Minerals, approved on August 7, 1930, are being efficiently applied. These inspectorships have made possible the inspection of the petroleum industry and in consequence, the availability and concentration of statistical data. This enables the public administration to control adequately petroleum affairs of the country.

The technical inspector of Maracaibo in his report mentions that the spirit of opposition to the new law, manifested in the beginning by certain petroleum companies, has slackened with the functioning and comprehension of the usefulness of the various provisions. There now exists a spirit of cooperation beneficial to both the Government and producing concerns.

IN the report of the Director of the Technical Department of Mines, contained in the Fomento Report for 1931, emphasis is directed to a matter alluded to by the writer in a review of Venezuela Petroleum for 1929, published in WORLD PETROLEUM, June, 1930.

The report deals with employment of Venezuelans by petroleum companies operating in Venezuela, as follows:

"The Technical Department of Mines (Sala Tecnica de Minas) does not wish to let this opportunity pass without touching on a point which it considers of primary importance. This is the considerable disproportion existing between the number of foreigners and Venezuelans employed by the petroleum exploiting companies. Our laws do not establish any rules in this regard; but the circumstances do not justify any procedure outside of the equity and consideration to which natives of Venezuela are entitled from those who come to exploit its riches. This, the oil companies understand very well, because in their annual reports they count the Venezuelan workmen as "employees" with the purpose of creating the appearance, before the eyes of their own people, as well as foreigners, of complying with this duty of courtesy and justice.

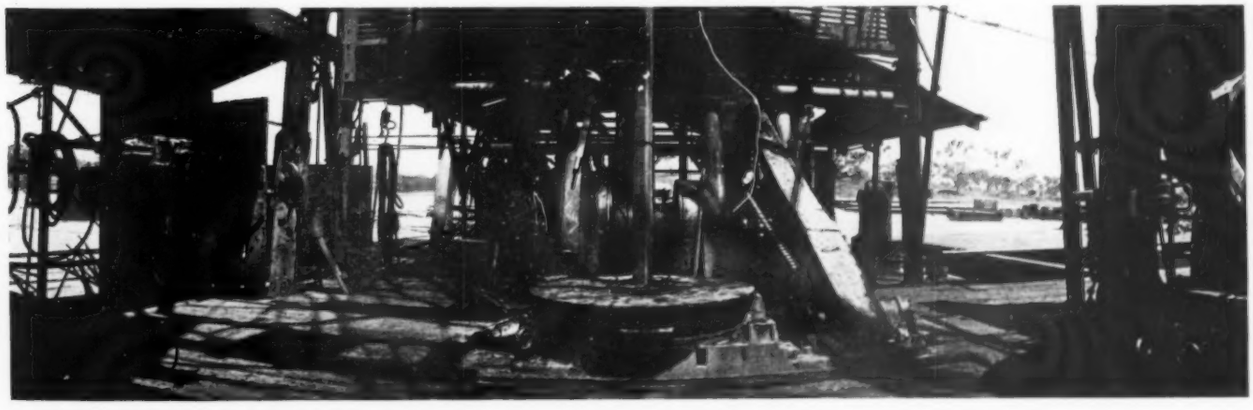
"In the reports of last year, for instance, the Caribbean Petroleum Company states that they have in their employ 3,337 Venezuelans and 1,123 foreigners; the Venezuela Gulf Oil Company states that in January of the same year they gave employment to 3,323 Venezuelans and 742 foreigners. Such data are misleading for out of the 6,600 Venezuelans that appear as employees only two percent, at the most, are really "employees," who actually occupy insignificant positions, the balance of 98 percent being laborers earning day wages. With regard to the Lago Corporation; this company says that they have 1,450 peons, 412 artisans, 9 drillers, 78 technical experts, 272 office employees, and 144 persons occupied in other kinds of work, and that out of these workmen, 1,671 are Venezuelans, 227 Americans, 277 from the West Indies, 36 Chinamen, 131 Europeans, 19 Latin Americans and 3 from the Guianas. But the report does not specify the kind of activities in which the said 1,671 Venezuelans are occupied.

"The general manager of the British Controlled Oilfields Limited, in his report corresponding to the year 1929, even goes so far as to note down the following: 'As customary, this company has followed the rule of placing Venezuelan employees in positions of responsibility, and the results of the confidence placed in them by the company has been entirely satisfactory.' The fact is that in their office in Maracaibo there are a few Venezuelan employees holding unimportant positions; but in their Mene office, and in their fields, mostly all are foreigners, the majority being from the West Indies.

6 in. line from El Mene to the sea.

Richmond Petroleum's wildcat in Perija is one of the deepest wells ever drilled in South America. A Waukesha portable gasoline engine was used. Depth over 7,000 ft.

Photo. Pan American Airways, Inc.



"Representatives of these companies should take this matter into consideration, and think over the advisability of giving those Venezuelans who, by their capability and efforts, deserve an opportunity, positions of some significance in their enterprises. This is the practice in other countries where this industry is also in the hands of foreigners. 'Of the twelve Chiefs of Department that we have here in Mexico,' it was stated here at a banquet by one of the directors of an important petroleum company, *'nine* are Mexicans, and we are very satisfied with them because they discharge their duties with accuracy and efficiency.

"Companies associated with the same interests as those established in Venezuela are exploiting petroleum in other countries, and are proceeding with greater liberality. In Trinidad there are quite a number of natives to whom opportunity has been given in the petroleum fields to learn drilling. Some of these Trinidad natives at present are making their living as drillers, in Trinidad, here in Venezuela, and in Colombia, while in the Venezuelan fields not even one of our compatriots has been allowed to become expert in the profession."

OFFICIAL PRODUCTION OF PETROLEUM IN VENEZUELA DURING 1930

(Conversion Ratio; 1 ton = 7 bbl.)

	January (Barrels)	February (Barrels)	March (Barrels)	April (Barrels)	May (Barrels)	June (Barrels)	July (Barrels)	August (Barrels)	September (Barrels)	October (Barrels)	November (Barrels)	December (Barrels)	Total (Barrels)
The Caribbean Petr. Co.	1,760,318	1,565,109	1,868,272	1,648,353	1,795,451	1,965,845	1,568,001	2,060,096	2,181,228	2,018,520	1,504,391	1,114,736	21,050,320
Venezuela Gulf Oil Co.	2,520.528	2,276,583	2,504,088	2,436,752	2,529,459	2,421,492	2,550,451	3,088,477	2,456,167	2,528,246	2,464,175	2,558,682	30,335,100
Lago Petroleum Corporation	3,404,198	3,084,572	3,428,832	3,296,994	3,419,790	3,277,353	3,390,837	3,469,529	3,243,296	3,404,653	3,317,307	3,073,182	39,810,543
The Venzln. Oil Concess. Ltd.	3,914,267	3,640,630	3,875,459	3,037,041	3,250,072	3,368,316	3,514,005	3,540,226	3,374,210	3,362,100	3,252,732	3,182,879	41,311,937
The Colon Develpmt. Co. Ltd.	116,970	405,636	571,319	483,301	398,734	390,887	378,004	396,429	408,863	437,409	394,030	491,421	4,873,003
British Controld. Oilfds. Ltd.	139,345	129,921	161,978	152,993	169,258	155,904	154,274	148,719	136,543	143,091	133,487	138,550	1,764,063
The Bermudez Company	22,477	26,695	16,524	50,506	32,792	25,581	45,482	14,363	12,486	10,492	10,366	11,237	279,001
Richmond Petr. Co. of Venzla.	5,029	5,952	5,793	4,660	8,457	6,556	.....	.....	.....	.....	.....	.....	36,447
Orinoco Oil Co.	152	117	.....	.....	.....	.....	.....	.....	196	175	.....	219	859
Std. Oil Co. of Venezuela	4,576	7,520	24,967	7,033	11,390	5,693	14,726	113,783	214,327	252,406	382,975	275,690	1,315,086
American British Oil Co.	623	968	29	1,192	3,990	2,530	2,021	3,674	451	1,363	1,370	6,685	24,896
Central Area Exploitation Co. of Venezuela	2,912	2,281	2,696	2,692	2,429	2,310	2,389	2,053	2,065	1,844	1,275	1,918	26,864
Rio Palmer Oilfields Corp.	371	13	.....	.....	.....	.....	.....	2,694	.....	.....	.....	7,735	10,813
Tocuyo Oilfds. of Venzla. Ltd.	2,205	7,392	7,476	10,164	20,139	26,376	27,223	23,338	21,224	20,463	17,486	16,331	199,817
Coro Petroleum Co.	.....	.....	.....	.....	.....	.....	10,508	11,954	3,732	1,898	6,125	4,280	38,497
Creole Petroleum Corp.	.....	.....	.....	.....	.....	.....	.....	.....	91	.....	.....	.....	91
Totals	11,893,971	11,153,389	12,467,433	11,131,681	11,641,961	11,648,843	11,657,921	12,875,335	12,054,879	12,182,660	11,485,715	10,883,545	141,077,337

EDITORIAL NOTE—Venezuela Gulf Oil Co's. exports include part of the Standard Oil Co. of Venezuela's shipments.

COMMERCIAL EXPORTS OF PETROLEUM FROM VENEZUELA DURING 1930

(Conversion Ratio; 1 ton = 7 bbl.)

	January (Barrels)	February (Barrels)	March (Barrels)	April (Barrels)	May (Barrels)	June (Barrels)	July (Barrels)	August (Barrels)	September (Barrels)	October (Barrels)	November (Barrels)	December (Barrels)	Total (Barrels)
The Caribbean Petr. Co.	1,622,726	790,998	1,522,134	1,402,408	1,638,886	1,487,041	1,739,804	1,741,491	1,758,645	1,475,439	1,445,701	811,384	17,436,657
Venezuela Gulf Oil Co.	2,375,380	2,411,850	2,391,375	5,563,425	2,736,895	2,540,300	2,568,615	3,088,477	2,913,925	2,663,920	2,047,150	2,382,450	33,683,762
Lago Petroleum Co.	3,587,420	3,265,108	3,605,013	3,503,450	3,589,596	3,725,143	3,814,401	3,728,323	3,504,410	3,708,285	3,552,067	3,636,640	43,219,856
The Venzln. Concessions Ltd.	3,957,317	3,495,172	3,382,264	3,331,740	3,336,885	3,357,070	3,313,246	3,502,339	3,114,128	3,393,439	3,470,767	3,182,403	40,836,770
British Contrld. Oilfields Ltd.	139,622	135,803	151,403	135,673	170,220	144,246	160,292	132,290	134,556	133,559	133,821	153,823	1,725,308
The Bermudez Co.	.....	.....	.....	32,482	.....	.....	66,572	32,616	.....	.....	.....	.....	131,670
The Colon Develpmt. Co. Ltd.	18,362	381,511	561,429	509,006	439,227	348,567	383,667	386,631	345,062	393,708	413,451	489,944	4,670,565
Std. Oil Co. of Venezuela	.....	.....	.....	.....	.....	.....	.....	.....	205,821	220,696	213,706	308,788	949,011
Tocuyo Oilfds. of Venzla. Ltd.	.....	.....	.....	.....	.....	36,183	.....	43,540	.....	42,028	.....	36,645	158,396
Totals	11,700,827	10,480,442	11,613,618	14,478,184	11,911,709	11,638,550	12,046,597	12,655,707	11,976,547	12,031,074	11,276,663	11,002,077	142,811,995

EDITORIAL NOTE—Standard Oil Co. of Venezuel's production totalled 6,944,000 bbl. Part of this is incorporated in the Venezuela Gulf Oil Co.'s. figures.

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U. S. A. Petroleum Foreign Trade

EXPORTS listed below do not include the fuel oil, Diesel oil and lubricating oil bunkered in the United States by foreign ships, which amounts to about 15,000,000 bbl. per quarter. Part of this, however, is fuel oil from Curacao and Aruba. Some ships carry excess bunkers and transfer the surplus fuel oil to other ships abroad. In addition to the petroleum products listed the United States imported 6,969,000 lb. of wax, but exported 76,036,000 lb. during January, February and March, 1931. Imports and exports of wax in the first quarter of 1930 were practically the same as this year.

The greatest part of the crude oil came from Venezuela, Colombia and Mexico, only 656,000 bbl. coming from all other countries. The United Kingdom bought 3,778,000 bbl. of motor fuel in the first three months of this year, or a greater quantity than the total quantity of gasoline imported into the United States. France was America's next best customer for motor fuel, buying 1,612,000 bbl. Both countries purchased less motor fuel from the United States of America, than they did in the same period last year, indicating that part of the supply from refineries in the Dutch West Indies has been diverted from the United States to European markets.

(Department of Commerce Figures)

	First Quarter 1931		First Quarter 1930	
	Imports (Barrels)	Exports (Barrels)	Imports (Barrels)	Exports (Barrels)
Crude Oil	12,857,000	5,215,000	14,598,000	5,483,000
Motor Fuel	3,671,000	11,455,000	3,401,000	16,703,000
Kerosene	2,000	3,433,000	15,000	4,918,000
Gas Oil & Fuel Oil	6,876,000	7,795,000	7,163,000	9,743,000
Lubricants	8,000	1,791,000	7,000	2,507,000
Totals	23,414,000	29,689,000	25,184,000	39,354,000

Far Eastern Markets and Sakhalin Oil

Crude Production to be Sextupled, and Two Refineries Built Before 1933, in Soviet's Plans for Expanding Petroleum Sales in the Far East and Antipodes.

By J. Wegrin

UNDER the Soviet Oil Industry's Five-Year Plan Sakhalin is due to produce 1,820,000 bbl. of crude oil in 1931 and 11,500,000 bbl. by 1933. This year a refinery will be built at Khabarovsk to meet the requirements of Russia's market in the Far East, and next year construction of a refinery will be started at Vladivostock for the purpose of export.

In its April issue WORLD PETROLEUM intimated that for the time being Russia is unlikely to enter the Chinese kerosene trade on an extensive scale with supplies from Black Sea ports. The expansions planned for Sakhalin, on the other hand, are indicative of the determination of the Soviets to enter the oil markets of the Far East before long. It is very likely that Sakhalin oil will have some strategic value for this market, as there are no other appreciable oil resources along the East Coast of the Pacific. The main oil resources of today for this market are U. S. A. and the Dutch East Indies, which are situated at greater distances than Sakhalin from Japan and East and Central China.

Growth of Imports

AN outstanding feature of the Far Eastern market is the steady growth of imports. For some years past importations have far exceeded the ratio growth of other markets (Europe and the Near East in particular) a fact which has been noticed and actively followed up by the Soviet Oil Trust. It is the contention of the Oil Trust that, while in all other markets it has to encounter the opposition of both domestic and international oil organizations, in the Far East it probably will have to cope only with the opposition of the international organizations.

The chief markets of the Far East are Japan, China and Australia, and following are brief outlines of conditions prevailing, as well as some facts and figures pertaining to trade in petroleum and its products in these distant countries.

Japan

THE Asahi Petroleum Company, and a few others of minor importance, are engaged in producing and selling crude oil. They are operating the native fields under difficulties and in competition with imported crude sold in Japan more cheaply. They have in consequence sustained losses for some years past. Domestic production has been steadily declining. At its best it constituted 20 percent of the demand. The growing popularity of the automobile, however, has created an increased demand, and the major portion of the country's needs is imported. Nevertheless, Japan's imports of gasoline are small in relation to other products, owing to the fact that the highway system of the country is still limited and the gasoline demand consequently is comparatively small. Furthermore, there is plenty of refining capacity in Japan.

The wide use of electricity for lighting has curtailed the use of kerosene for illumination; but the rapid conversion of the fishing fleet to power is balancing the demand. There is a large net work of hydro-electric power plants, and the country has plenty of coal, so the consumption of fuel oil is light.

Imports for the Years 1927-1929

	1927 (Barrels)	1928 (Barrels)	1929 (Barrels)
Crude (incl. fuel oil)	3,872,760	9,063,212	9,999,562
Gasoline	433,357	248,419	233,648
Kerosene	1,273,189	1,631,122	2,152,407
Lubricating oil	152,437	316,614	321,980
Totals	5,731,743	11,259,367	12,707,597

In 1930 Japan imported 12,268,571 bbl. of petroleum products, of which gasoline consumption amounted to 3,795,238 bbl. There are 10 refining plants in Japan with a total capacity of 20,000 bbl. per day. Six of these refineries are owned by the Nippon Oil Company; two are operated by the Asahi Oil Company, while the Ogura Oil Company and the Kyodo Oil Company operate one refinery each. The Japanese concessionaire at Sakhalin, the Kito Karafuto Sekio Kaisha, purchases some crude from the Soviet Oil Trust apart from its own production at Sakhalin. In 1930 Kito Kara Uto purchased about 1,000,000 bbl. of Sakhalin crude from the Soviets. There is also a considerable importation of crude into Japan from the U. S. A., as well as from the Dutch East Indies.

Although only a small amount of crude has been tapped in Taiwan, there is likely to be an extensive development before long; but foreign companies eventually may be eliminated. Gas is very plentiful in the Kinsui and Gyunikuki fields, and a 600 bbl. per day gasoline extraction plant is in operation, and will be expanded to about 1,500 bbl. daily capacity. The sugar and pineapple industries are adopting gas fuel. The Japan Oil Company, in which American oil companies are interested, controls all petroleum production activities in Taiwan. The probable increased production will augment Sakhalin supplies. and the tendency is to establish a national refining industry.

China

SINCE the World War China is becoming more and more industrialized, and in recent days development of motor transportation is noticeable for it is beginning to supersede other methods of travel for both passenger and freight. Potential gasoline consumption of China is enormous. With it, of course, goes a natural increase of consumption of lubricants and gasoline and fuel oils. Kerosene import figures for 1927, 1928 and 1929 were published in WORLD PETROLEUM for April, 1931. It is the most important product imported into China, except cotton. Regular importation of kerosene began in 1870, and at the end of the century it was accepted generally as a substitute for animal and vegetable oil for illuminating purposes. Today it is shipped into the remotest parts of the interior where no other foreign product has ever appeared.

Until 1890 all kerosene shipped to China came from the United States, and even today about 80 percent is American. At the end of the century Russian oil entered the market, and was shortly

afterwards followed by supplies from the Dutch East Indies. Then there began a price competition which lasted for some years. At the time of the Russo-Japanese war Russian oil became a minor factor. The American and Dutch-British interests fought out their battles and apparently came to an understanding. Today the United States share in China's petroleum business comprises 70 percent of the kerosene requirements, 45 percent gasoline, 75 percent lubricating oil and 45 percent fuel oil. Until 10 or 12 years ago the entire fuel oil trade was controlled by the Dutch-British interests.

Petroleum Products Imported Into China

	1927 (Barrels)	1928 (Barrels)	1929 (Barrels)
Gasoline	316,487	479,260	684,318
Kerosene	4,005,481	6,266,977	5,877,460
Lubricating oil	198,567	304,995	331,588
Fuel oil	1,210,083	1,696,920	1,497,807
Totals	5,730,618	8,748,152	8,391,173

In 1930 the kerosene imports were about 30 percent below those of 1929, but official figures are not yet available.

The recent drop in kerosene imports is due partly to the advance of electric lighting, partly to the falling price of silver which has reacted in higher prices for kerosene, and partly to general business and living conditions.

There is no noticeable native production of oil in China. Seepages have been found in many places, and have attracted attention, but with little production success so far. Oil wells have been producing in Yeng-chang for the last 20 years, but their production has been decreasing. At one time American interests were engaged heavily in drilling of wells in the North Shensi basin, but the efforts were abandoned.

The Chinese market in general is a very spectacular affair, very efficient marketing methods are necessary for success. Important factors of the trade are: brand, quality, price, packing and —most of all—confidence of the buyer in the seller. The bulwark of the trade is credit, and the granting of such to Chinese on the usual type of security is not always safe.

The problem of duties and taxation is very complicated. In 1928 the large oil companies came to an understanding with the Government regarding the imposition of taxes. This agreement exempts imports of these companies from many of the levies collected on all other products.

Australia

A CONTINENT of almost 3,000,000 square miles with a population of a little over 6,000,000, or about two people per square mile, has today more automobiles per capita than any other country except the United States and Canada, and ranks sixth in world registration of motor vehicles. On January 1, 1930 there were 580,028 motor vehicles in Australia, against 26,653,450 in the U. S. A.; 1,128,014 in Canada; 1,449,941 in Great Britain; 1,294,167 in France; and 636,500 in Germany. In addition to this there are thousands of tractors and stationary engines which run on petroleum. The Government of Australia has spent over $1,000,000 in exploration for crude petroleum in South Australia. A bonus of about $25,000 is still awaiting the discoverer who will produce 100,000 bbl. of oil.

Petroleum Imported Into Australia

	1925/26 (Barrels)	1927/28 (Barrels)	1927/28 (Barrels)	1928/29 (Barrels)
Crude oil	1,580,515	2,219,814	2,126,196	2,988,411
Gasoline	4,133,336	4,162,940	5,082,021	5,713,945
Kerosene	782,043	958,379	991,560	1,145,468
Lubricating oil	328,481	394,811	349,293	360,415*
Gas & Fuel oil	38,960	32,393	106,991	145,800*
	6,863,335	7,768,337	8,656,061	10,354,039*

Australia annually imports nearly 6,000,000 bbl. of motor fuel, and refines about 3,000,000 bbl. of imported crude. As gasoline sells in bulk at the dock for 14 to 16 cents per Imperial gallon, the country forms a very attractive market to oil companies.

There are two refineries in operation in Australia namely: The Commonwealth Oil Refining Co. at Laverton, Victoria and The Shell Co. of Australia at Clyde, New South Wales, which was formerly owned by John Fell and Company. A third refinery is to be built by the Vacuum Oil Company at a reported cost of $5,000,000, but an obstacle to the plans has developed due to an import tax of 65 cents per U. S. bbl. having just been placed on crude oil, in addition to the existing tax of $2.61 per U. S. bbl. on domestic manufactured gasoline.

The Commonwealth Refinery is capitalized at £850,000 and the shares are divided between the Anglo Persian Oil Company and the Commonwealth Government. The equipment is in part modern, although the original equipment was purchased second hand from the British Australian Oil Company. It produces about 160,000 bbl. of gasoline, 200,000 bbl. of kerosene, and 550,000 bbl. of fuel oil per year.

The Shell refinery has been considerably improved since it was purchased from John Fell and Co. It includes a cracking unit and several pipe stills. The total capacity is approximately 300,000 bbl. of crude per year.

Crude imported into Australia comes mainly from British Borneo and the United States. Australia ranks fourth as importer of gasoline. It was exceeded only by Great Britain, France and Germany. The increases for the past few years are noteworthy.

Most of the gasoline is distributed in bulk to filling stations that are provided with pumps, although a large trade is still carried on in cased goods. Most of the bulk trade is done in the following six cities: Sydney, Melbourne, Brisbane, Adelaide, Perth and Hobart. Population of these cities aggregates 3,000,000, or over 48 percent of the total. The price of gasoline has been ranging from 52 to 54 cents per Imperial gallon, which includes a 14 cent tax, but in recent weeks the price has dropped to around 48 cents.

Distribution figures at about 14 cents per gallon. The quality of the product, however, is unusually high. Lubricating oils are mostly of United States origin. The 349,293 bbl. imported during 1927-28 came from the following countries: 343,586 bbl. from the U. S. A.; 2,207 bbl. from the United Kingdom; 1,567 bbl. from the Dutch East Indies; 1,225 from Germany, and 708 bbl. from Russia.

It is to be noted that the main markets of the Far East and Antipodes had a capacity of over 30,000,000 bbl. of oil in 1929, and when the requirements of the lesser markets such as New Zealand, Maylaya, Chosen, Formosa, Indo-China, the Philippines, etc. are added, together with bunkers for the various navies, there is a market for approximately 45,000,000 bbl. of oil. These markets have no appreciable crude or refinery resources of their own, and are within a stone's throw from Sakhalin.

Unquestionably Sakhalin oil will sooner or later strive to force its way into these markets; it remains only to be seen whether it will be in a position, from an economical point of view, to compete in point of price and quality. International oil organizations have been established in these markets for over half a century and are backed by years of experience and understanding, friendly relations and good will.

International News and Reports

GREAT BRITAN has increased her petrol tax to six pence per Imperial gallon.

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The derrick photograph reproduced on the front cover of this issue of WORLD PETROLEUM is by Will Connell, the well known Californian photographer.

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A clash betwen oil workers and troops occurred at Negritos, near Talara, Peru, on May 24; on May 26 the Peruvian Government announced that quiet had been restored.

▼

The Malay States import over $9,000,000 worth of petroleum products, mostly fuel oil and kerosene. Fuel oil imports amount to about 600,000 bbl. There is an import tax of 10 cents per gallon on kerosene.

▼

After 19 years under a legal ban, the Standard Oil Company of Kansas may retail petroleum products, and operate its own motor fuel stations. The Kansas Supreme Court has rescinded the old order which restrained the company from such operations.

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Regulations, under the new Colombian petroleum law, will not be issued for some time, according to presidential decree 820, issued during the past month. Delay in the promulgation of the regulations is due to the complexity of the problem and the vast amount of study necessary.

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Returning from a four months' trip into the remote areas of Guerrero and Oaxaca States, Mexico, Anita Brenner, author, states that over an area of 300 miles she did not encounter a single spring or river where the waters were not polluted by oil, seepages. Petroleum drips from the hillsides, and there are asphalt, seepages everywhere.

▼

The new Republican Government of Spain has cancelled the recent contract with Roumania for a large supply of petroleum products, and has entered into a contract with the Russian Oil Trust. This covers approximately half the oil requirements of Spain, the other half being supplied by American companies, including Cities Service Company and the American Republics Corporation. No material change is expected by the American companies in the quantitiy of oil which they furnish.

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France imported approximately 26,000,000 bbl. of crude oil and petroleum products during 1930, or an increase of about 4,750,000 bbl. over 1929.

▼

Shipments of refined petroleum products from Californian points to Eastern points in the U. S. A. during the first three months of 1931 amounted to 5,141,000 bbl., or 519,000 bbl. under the 1930 shipments for the same period.

▼

Unit operation over 770 square miles of area in Eastern Venezuela has been put into practice by the Creole Petroleum Corporation; the Venezuela Atlantic Refining Company; the Lago Petroleum Corporation; the Cordillera (Sinclair) Petroleum Corporation; the Mexican Seaboard Oil Company, and the Cia. Espanole de Petroles.

▼

Following the recent withdral of The Texas Company from operations in Colombia, the Sinclair Exploration Company announced a similar action. This was the result of the company's dissatisfaction with the provisions of the new petroleum law, which were discussed in the April issue of WORLD PETROLEUM. The Sinclair office in Colombia has been closed, and its property in Ocana will be left under guard but otherwise abandoned.

▼

Regarding the article on Germany's oil industry in the May issue of "World Petroleum," Arthur T. Beazley general manager of Anglo-Ecuadorian Oilfields, Ltd., of London, draws our attention to a reference on page 322 to the effect that the Anglo-Foreign Oil and General Trust Company Limited of London belongs to the so called Mercurio concern (Anglo-Ecuadorian Oil Company) Mr. Beazley advises that his company has no connection with the Anglo Foreign Oil and General Trust Company and that the author evidently intended to refer to the Concepcion Ecuadorian Oilfields Limited, all the capital of which was, he understands, subscribed by the Anglo-Foreign Oil and General Trust.

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Towards the end of May the agreement between the Iraqi Government and the Iraq Petroleum Company was ratified. The pipe line to Haifa and Tripoli will be completed in about four years. Formal ratification of the agreement between the Lebanese Government and the Iraq Petroleum Company also has been made by the Lebanese parliament.

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The Eleventh Congress of Industrial Chemistry will be held in Paris from September 27 to October 3, 1931. The program of the Congress will be devoted largely to industrial chemistry in colonial regions, including problems relating to the production of liquid and gaseous fuels. Any person may attend by enrolling in the Société de Chimie Industrielle.

▼

Refiners have been busily engaged in their own undoing by developing more production than they ever dreamed was possible, according to Walter C. Teagle, president of the Standard Oil Company of New Jersey, speaking at the Bond Club luncheon in Newark, N. J., recently. Mr. Teagle also mentioned that the question of future supplies of raw material for the petroleum industry was no longer a cause for alarm.

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A decree was issued on May 8, by the Colombian Government providing that bids for exploration and exploitation of natural oils located in nonreserved territories at the east end of Eastern Cordillera, at the Putumayo Commissary and at the Amazonas, will be received by the Minister of Industries on or after October 15, next. Bids for contracts on other nonreserved territories will be received on or after August 1, next.

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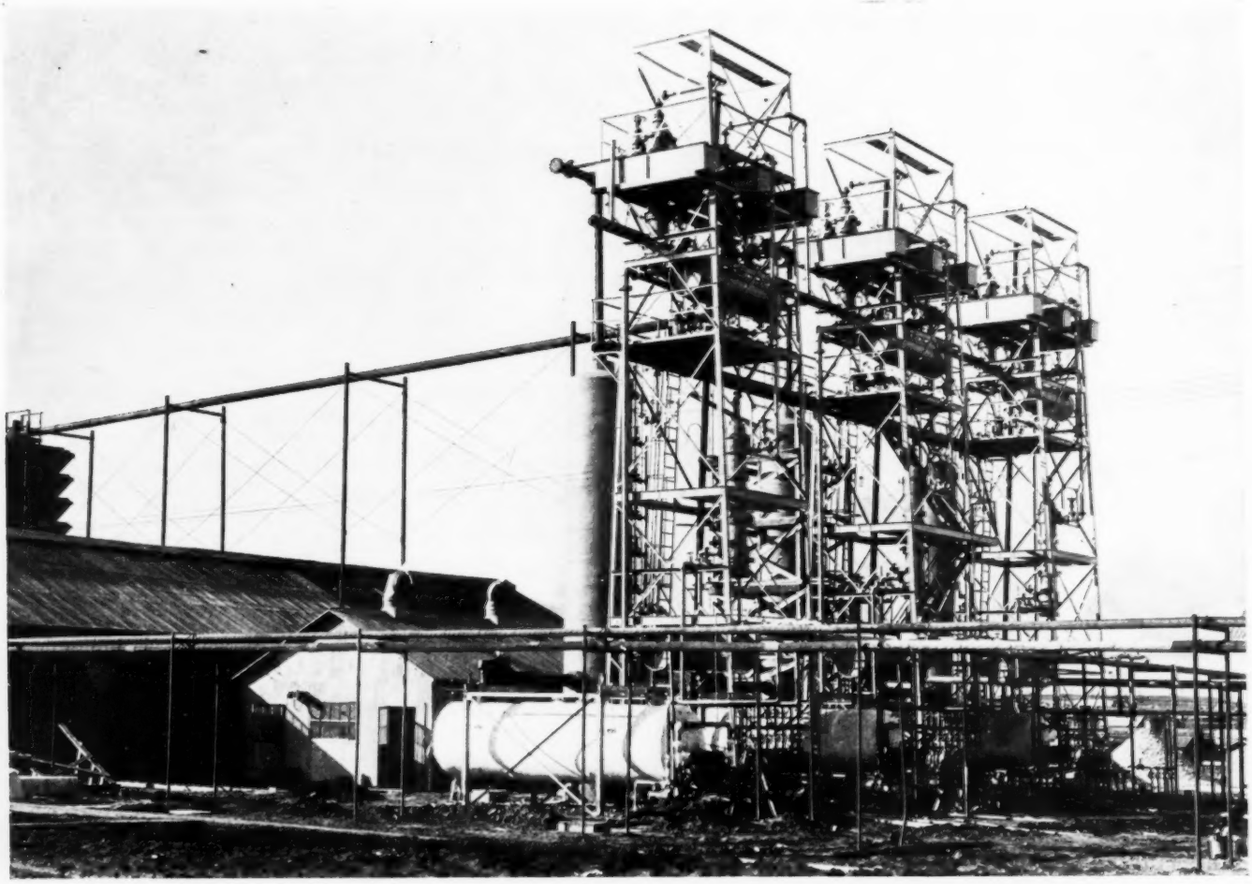
Mexican Maze, by Carleton Beals, (J. B. Lippincott Company, Philadelphia publisher, $3.00).

Selected by the Book League of America as its June choice, the new book *Mexican Maze* maintains that American oil interests seeking the anexation of Mexico have insidiously fomented the state of unrest so prevalent during the last several years. Many American oil claims, Mr. Beals says, are based on fraud and corruption.

Carleton Beals is a newspaper correspondent and writer on South and Central American affairs.



Typical rectifying apparatus at the No. 2 plant of Phillips Petroleum Company, Burbank oilfield.

Progress of Liquefied Petroleum Gas

Grown Out of the Difficulties of the Natural Gas Industry the Annual Consumption Has Reached 18,000,000 Gallons, or About One Day's Potential Production.

By Benjamin T. Brooks

Consulting Engineer, New York.

A LITTLE bit of gasoline surrounded by $500 to $5,000's worth of automobile takes the fresh air and garden loving suburban dweller into the country, and has changed ways of living—particularly in the United States—in a hundred familiar ways. Liquefied gas—a very near relation to gasoline—has brought to the farm and country residence all the cleanliness of cooking with gas. Liquefied gas, transported by tank car, has brought the small town its gas supply already manufactured, pure, ready to mix with air and burn; it also has brought B. T. U.'s in a new form to the manufacturer.

Liquefied gas has been industrially important only since 1928. It is usually interesting to ask, "Why was such-and-such a such a thing not done years ago?" And, nearly always one finds small costly beginnings, small business tragedies, a wobbly struggle and finally the "new" thing. And so with liquefied gas, often called liquefied *petroleum* gas. As a matter of fact the new industrial fuel has been the discard of both the petroleum and the natural gas industry. This new transportable gas consists of propane or butane, two normally gaseous hydrocarbons that are easily liquefied by moderate pressure, and again easily converted to gas by release of the pressure. About 30 percent of the light gasoline extracted from natural gas is butane. Propane passes off as gas too readily, is too *wild* to be included in any commercial gasoline not held in pressure tanks, and would not only cause vapor lock in the carbureter of an automobile,

but it would be a great hazard if not properly confined and handled. Also the natural gas companies do not want the butane in their high pressure natural gas mains, where it may liquefy in cold weather and cause trouble. One is tempted to say, hence, liquefied gas! But the tale is not as simple as that.

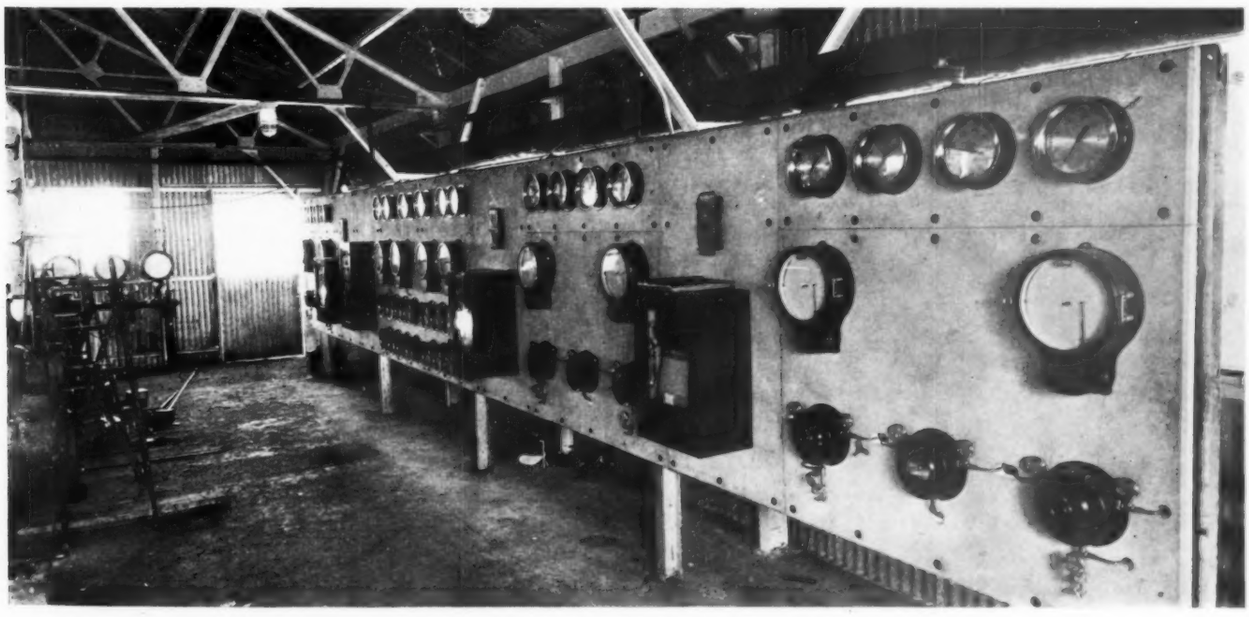
The value of a few million B.T.U. depends primarily upon where the B.T.Us. are, and transportation of liquefied petroleum gas has always been and still is one of its major costs. Highly compressed, but not liquefied oil gas, transported in small steel cylinders, was familiar a generation or so ago as *Pintsch* gas, and used for lighting railway coaches. A little later Hermann Blau of Augsburg, Germany, patented the first commercially used liquefied hydrocarbon gas, known the world over as Blau gas. Both Pintsch gas and Blau gas were made by cracking oil in small retorts, a crude apparatus evidently adapted from the earlier coal gas retorts. The gas was purified by removing tar, easily condensible oils, and malodorous sulfur compounds, and the final product sold was, in both cases, but a small fraction of the original oil. Manufacture and transportation were both costly, too costly to talk about B.T.U. value. Their value was candle power, and the electric lighting of railway coaches spelled the exit of these gases from industry.

In the meantime, however, the transportation of other liquefied gases in steel cylinders was rapidly growing. Liquid carbon dioxide for carbonated beverages, liquid ammonia for refrigeration and liquid chlorine for textile bleaching and water sterilization, all gave the railroads a rapidly growing tonnage of steel pressure cylinders. Milions of these containers were handled and shipped without accident.

Protane burning range of the dirigible Akron.

Then came the pressure tank car. The earlier familiarity of the carriers with liquefied gases, the improvements in the art of steel welding and the exigencies of the World War, all contributed to bring forth the pressure tank car. At first we were shocked by the idea of shipping a tank car of liquid chlorine, but the history of this car movement during the last 15 years has been very satisfactory to all concerned, and now such things as liquid hydro-fluoric acid, used in the manufacture of a new refrigerant, has been added to the list. All this transportation development paved the way for making the new industrial fuel cheaply transportable, at least in comparison with the small cylinder method. While small cylinders are widely used for handling liquefied petroleum gas at the point of consumption, as domestic fuel for example, the long distance haul is by tank car or by pipe line, as liquid, then by pressure tank wagon to the consumer where the cylinders are filled.

Liquefied petroleum gas did not originate as a substitute for Blau gas. When the natural gas pressure of the wells supplying Pittsburgh decreased to the point that it became difficult to supply the city, larger low pressure mains were laid until a young heretic put in a compressor station to boost the gas pressure. It was then noted that the low pressure gas from many wells partially liquefied under pressure. The writer recalls an instance near Tidioute, Pennsylvania, where a low pressure gas readily liquefied to a liquid consisting chiefly of butane. This liquefaction trouble quickly aroused the interest of George Burrell, George Oberfell and Walter Snelling of the United States Bureau of Mines, in Pittsburgh, and also of A. N. Kerr, an engineer of the Riverside Oil Company, and of Franklin Peterson of the Bessemer Gas Engine Company. Kerr produced liquefied petroleum gas at Sistersville in 1910 and Peterson, becoming interested in the recovery of gasoline from



Control panel of the rectifying apparatus.

natural gas, developed the first compression plants for the manufacture of this grade of gasoline from natural gas. Compression plants for the recovery of gasoline began to be installed rapidly in 1912.

These were the small beginnings of this industry. The pioneers are still young men, and they have had the pleasure of seeing the production of this grade of gasoline grow to about 2,000,000,000 gallons annually.

The liquefied petroleum gas industry has grown out of the difficulties of the natural gas gasoline industry. In the so-called early days the common practice was to allow the low boiling portions of the "wild" gasoline to escape from the light volatile condensate, thereby losing half to two-thirds of the original material. If not sufficiently weathered a tank car of such gasoline might be nearly empty when finally delivered, and was a serious hazard enroute. It was a natural step, therefore, to subject such volatile raw material to fractional distillation in order to "stabilize" it. By so doing the loss of valuable gasoline was minimized, and thereby hangs a tale important in the annals of patent litigation, since the courts have ruled that this procedure was a more or less obvious application of well known principles of physics and was not invention.

Liquefied Petroleum Gas Industry in 1930 in the U. S. A.

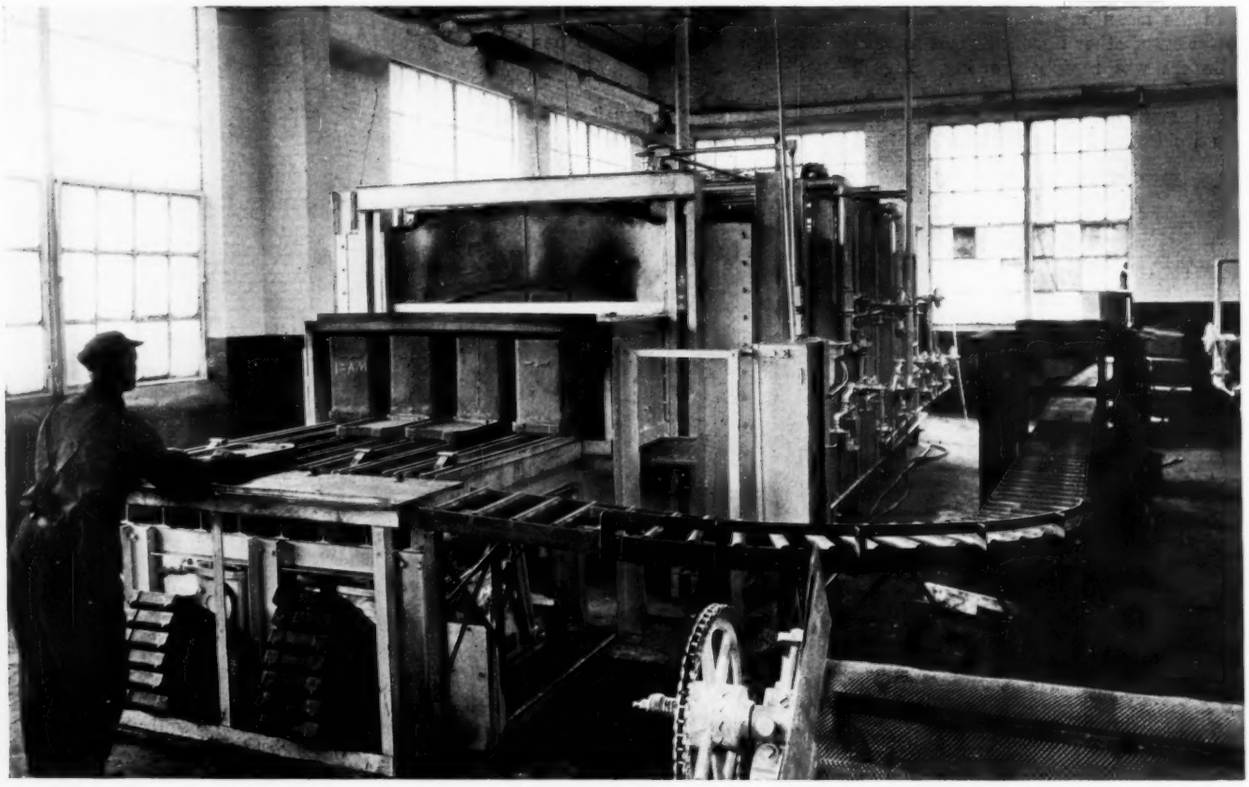
	Bottled Gas	Gas Mfr. and Ind. Gas	Total
Investment	$17,000,000	$5,475,000	$22,475,000
Number of retail customers	117,000	15,000	132,000
Retail fuel sales during year	$4,500,000	$350,000	$4,850,000
Appliance sales to date	$12,000,000	$1,500,000	$13,500,000
Number of persons employed	3,000	.....	3,500

But, these wild gases that caused all the trouble continued to be discarded. Were they unimportant enough to be considered merely the squeal of this particular pig? According to Mr. Oberfell there is a daily potential production of at least 13,000,000 gallons of liquefied petroleum gas from the natural gas gasoline industry of the United States, or more than double the amount of gasoline now produced from natural gas.

Gasoline recovery plants, however, are operated under conditions best suited for the economical recovery of gasoline and the proportion of butane and particularly propane, which is now separated incidental to gasoline recovery, is only about 12 percent of the potential total. The consumption of liquefied petroleum gas was only 4,500,000 gallons in 1928, and 18,000,000 gallons in 1930, or only a little more than one day's total potential production. If we assume that half of this potential production is from small isolated plants where the production of the liquefied gas would not be feasible or profitable, the present annual consumption is less than three days of such revised potential production. The advantageous use of this enormous quantity of raw material is one of the biggest problems of the oil and gas industry.

Those who enjoy seeing industrial history in the making will, therefore, keep an eye on this lusty youngster. According to Mr. Oberfell the data on the accompanying table show the condition of this three-year-old infant.

It is estimated that there are about 13,000,000 families in the United States in rural and suburban areas beyond gas mains, that now use such fuels as coal and wood, for cooking and water heating. Propane is the material which is chiefly supplied for domestic use. The accompanying illustration shows an



Charge end of continuous carburizing furnace fueled with butane.

aluminum stove adopted for use on the new dirigible AKRON. This stove uses propane and will do the cooking for the crew of about fifty men. It weighs 110 lb.

Butane is the liquefied gas which is mainly supplied to small town gas plants. It liquefies at atmospheric pressure at 26 deg. F. and is accordingly mixed with air and supplied to small town gas systems. At a delivered price of six cents per gallon this fuel is equivalent to 31 cents per thousand cubic feet of 530 B.T.U. city gas. There are now 110 small towns having installations for the use of butane-air gas.

The commercial grades of propane and butane now on the market show physical properties very close to those of pure propane and pure butanes (isobutane and normal butane), and bear excellent testimony as to the feasibility of separating such hydrocarbons by fractional distillation, a natural development from the so-called stabilizing of natural gas gasoline.

It will be recalled that during the visit of the GRAF ZEPPELIN it was refueled with substantially pure ethane separated by generally similar fractionation. This art of separating the normally gaseous hydrocarbons by fractional distillation of the liquid hydrocarbon mixtures has greatly benefited the chemical utilization of the gaseous cracked hydrocarbons in oil gas. Thus ethylene, separated from propylene, is now used for the manufacture of ethyl alcohol and ethylene glycol on a large industrial scale ,and propylene, separated from other reactive gases, is used for the manufacture of isopropyl alcohol and acetone. One company utilizes the pentane fraction for the manufacture of amyl alcohols. Butyl alcohols are also being manufactured from a very narrow fraction of butylenes and this fraction also contains butadiene, long sought by the chemist seeking to produce synthetic rubber.

The very general application of chemical engineering to the problems of petroleum refining during the last ten years has done a great deal to eliminate important differences in refining practice, narrowed technical competition, and helped to give the public better petroleum products at the lowest possible cost. Chemical engineering has solved the production problems in connection with liquefied petroleum gases and made them available at low cost. Their advantageous utilization in industry is already definitely indicated.

[A description of the first tank ship built to carry butane was given on pages 351-352 of the May, 1931, issue of WORLD PETROLEUM.—EDITOR.]

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Australian Government Jeopardizes Domestic Refining Industry

Darlinghurst, N.S.W.

AN announcement was made recently that the Vacuum Oil Company would erect a large refinery at Melbourne to cost approximately $5,000,000, providing the Victorian Government ratified the sale of land selected for the purpose.

On the day following this announcement the Federal Government made tariff alterations, which virtually place a duty of two pence an Imperial gallon on imported crude with a gasoline content of not more than 35 percent. H. C. Comforth, managing director of the Vacuum Oil Company Pty., immediately stated that under the circumstances the refinery could not profitably operate and that the scheme would be postponed, or cancelled. He pointed out that with crude imported duty free the difference between the duty of seven pence per Imperial gallon on imported gasoline and the four pence collected on gasoline refined in Australia permitted profitable refinery operation.

The new tariff on crude, however, would reduce the margin so substantially that a refinery could not pay interest on the capital laid out. The new duty will bear heavily upon the only two firms operating refineries in Australia; the Commonwealth Oil Refineries, Ltd., which is a subsidiary of the Anglo-Persian Oil Company, and Shell (Australia), Ltd., which obtain their crudes from Persia, and the Dutch and British East Indies respectively.

At the same time the Government increased the duty on gasoline in containers less than 40 Imperial gallons from seven pence to eight pence halfpenny per gallon. This practically ends the importation of case gasoline into Australia, the Government considering that the manufacture of tinplate and cases locally makes it unnecessary to import gasoline in such a form. This, particular reasoning needless to say, meets with the concurrence of the large companies who pack in their own bulk terminals.

Efforts to make this increase also effective on 44 gallon drums did not succeed, which enabled small independent importers to purchase in California and to sell at prices below those set by the five large companies.

The encroachment of the latter had its sequel on April 10th when price reductions of a penny a gallon were announced by the big companies on first and second grade gasolines respectively, wholesale prices being reduced from 2/- and 1/11d. to 1/11d. and 1/10d., and retail prices from 2/3d. and 2/2d. to 2/2d. and 2/1d. respectively. Competition between garages, however, has become very keen in both Melbourne and Sydney and actually the selling prices to the public are down to 2/- and 1/11d. for the respective grades. There is now practically no margin between the prices of the small independents, and the cut prices of the major companies. The price structure appears to be badly impaired, and there are rumours of secret rebates being given.

Under these circumstances the motor fuel business in Australia cannot be said to be in a healthy condition. The 30 percent exchange militates against the remitting of funds to overseas' sellers, the heavy duty, the 2½ percent sales tax, primage of 4 percent on 110 percent of the F.O.B. value, as well as heavy distribution costs, make a lowering market not easy sailing for companies with very large capital outlays. For the small drum importers (who have to meet exchange on drums as well as gasoline) the position is even more difficult. It may result in a considerable restriction of drum buying in California where case shipments to Australia will have practically ceased.

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THE Royal Dutch-Shell group in 1930 produced 167,860,189 bbl. of crude oil, compared with 176,290,709 bbl. in 1929. Production was curtailed, otherwise it would have totalled 203,000,000 bbl. last year. Of the 1930 production 38,668,154 bbl. was produced in the United States, this being 14,416,710 bbl. less than in 1929.

The Standard Oil Company (New Jersey) and subsidiaries produced 102,518,482 bbl. of crude oil in 1930, a gain of 606,743, bbl. over the previous year. Of this output, its properties in United States fields accounted for 51,906,114 bbl. and other countries 50,612,368 bbl.

Functions That Drilling Mud Should Serve

Extract from Paper Recently Read by Alexander Duckham, Vice-President Institution of Petroleum Technologists, London, which Gives Some Valuable Pointers.

SOME of the many purposes that mud should serve in the drilling of oil wells may be listed as follows:

1. To act as carrier of the cuttings from the bit to the surface.

2. To keep the cuttings in suspension, and so reduce to a minimum any settlement when circulation ceases, either voluntarily or involuntarily.

3. To prevent its own undue escape or leakage into the formation through which the drill passes, and thus not only prevent waste of an expensive article; but also prevent that loss of circulation which occurs if the formation absorbs mud to the capacity of the pumps.

4. To act as a lubricant not only between the formation and the rotating bit, but also to the drill-pipe.

5. To prevent the seizure, or "freezing," of drill-pipe, casing, etc.

6. To minimize the abrasive action of sand and rock particles in the pumps, etc., not only by acting as a lubricant, but also by obviating or reducing the entry of sand into the well.

7. By its cushioning and floating effect, to facilitate the accurate and smooth handling of casing under perfect control.

8. Nowadays, perhaps most important of all, by the pressure the mud exerts, to keep gas absolutely back in the formation so that operations should not be jeopardized by blow-outs, or the mud itself be rendered useless by impregnation with gas, generally referred to as "gas cutting." (This matter is so vital and, I venture to think, so much misunderstood, that I have, at the end of this list of purposes, referred to it again at some length!)

9. To perform this same function of imprisoning in the formation in the case of water and oil.

10. To plaster the walls of the hole and of cavities or exhausted sands, so as to prevent caving, collapse of sloughing.

11. As asserted by some drillers, to reduce the risk of getting a crooked hole, and this on the ground that the bit is kept clear of cuttings, i.e., of "balling up." But, may it not on occasion be rather responsible for a crooked hole if the strata be steep or if boulders be encountered, as one would expect that its very lubricating properties would tend to make the bit slide off at an angle from the vertical?

12. To minimize the danger of the cement in deep wells, setting before it gets beyond the shoe and so into the cavity to be cemented; this being prevented by its weight increasing the rate of the passage of the cement.

13. To facilitate the reliable taking of geological cores in high pressure formations.

14. Last, and far from least, to protect the driller and crew from the danger of blow-outs and, perhaps consequent fire. It is strange that nowhere does there appear to be any reference to this important function. Such security enables a man, however good he may be, to concentrate better on his work, as he has not his attention diverted by thoughts of the safeguarding of himself and the crew, and incidentally, of the valuable plant under his charge, so that he stands a better chance of getting everything fitted up in peace and quietness before he brings the well into production. Hurry and anxiety generally mean faulty work.

Three main properties of the mud, which it is desired to control by "doctoring," are:

1. Weight or specific gravity.
2. Body or viscosity.
3. Colloidity.

The following are a few of the snags which accompany "doctored" muds:

1. High specific gravity and high viscosity decrease the rate of separation of solids.

2. Good colloidity promotes gassing.

3. "Doctored" muds in contact with excessive salt water are dangerous, as owing to accumulation and separation the heavy constituents deposit rapidly.

4. When circulation is stopped, sticking of pipes owing to deposits of heavier solid matter may be more serious than with ordinary mud if the ingrediants are unevenly mixed.

5. Muds are much "stolen" by cavities or by porous formations, etc. Cases are on record when, owing to subsequent reduction of pressure, the mud comes out once more into the hole and causes serious trouble in production. I have in mind a recent case, where it took over three months to get rid of the barytes mud that came out in this way.

6. Muds, owing to their plastering effect, may be detrimental to oil production. When considering this point it has to be borne in mind that the mud, when it plasters a porous formation, does not remain as a soft coating.

Some dozen years ago I made a crude experiment when we were worried about rotary drilling in a formation where the pressures were not big and where the sands were not prolific, but the oil was of very high value. It was noticeable, that, whereas with a percussion drill we had no trouble in getting production, with a rotary we never get production. We took some pieces of sand rock and placed them in a tube capped at both ends, nearly filled the tube with the drilling mud and then pumped up to a pressure of 500 lb., and kept it at that for a week. The tube was opened, the sand rock taken out, thoroughly washed and sections were cut. The sand was penetrated to a depth varying between 1/32 in. to 1/8 in., and had thereby been rendered absolutely impervious; in fact, in appearance it seemed to be as close grained and as hard as slate. No amount of washing had any affect on this crust, and therefore it is no wonder that when washing a rotary well for production the results may be disappointing. Indeed, it would almost seem advisable to take the precaution of running in a reamer to break up the coating or, perhaps, of "shooting" with a small charge for the same purpose.

7. With mud, and specially with "doctored" mud, the driller is given something more to blame, and at the same time something more to go wrong, for after all muds are very sensitive to ill treatment.

8. Muds call for increase of power in pumping and drilling. Yet, when weighed in the balance, there is not the least doubt that it is beneficial.

Hair Belting for Oilfield Work

(Contributed)

EXACTING requirements of oilfield work call for a belt, which, day in and day out, will transmit efficiently the desired full load without danger of stoppage or breakdown. Such service can only be obtained by the highest degree of excellence in materials, workmanship, and application.

In so far as materials are concerned, practical experience as well as corroborative laboratory tests indicate a hair belt as being the most suitable yet produced for oilfield work. But, simply to specify a hair belt is no more indicative of quality of material than it would be to order a suit of clothes and specify that it should be made of cloth. So many different grades of hair are used for belting that it is necessary to indicate the exact type required.

Genuine Camel hair has proved itself to be the material par excellence for the manufacture of belting, as this hair possesses qualities which render it particularly suitable for transmission work.

It has a high tensile strength coupled with a remarkable degree of elasticity, properties which obviate the fatigue consequent upon the millions of stress fluctuations occurring between the tight and slack sides of a belt. This is a property of the individual hair itself, which is reflected in both the yarn and belt made from it, owing to the interlocking which occurs between the epitheliel scales of contiguous hair fibres. These scales are shown in the micro-photograph reproduced.

Another reason which makes camel hair so outstandingly superior to other hair is its insensitiveness to climatic conditions. This has been attributed to the fact that the bactrian camel from which the hair originates is subjected to extremes of heat and cold, and provident nature has supplied it with a coat which is impervious to such changes. This hair is also resistant to acid and oils.

Having assured oneself of the materials, the workmanship should next be taken into consideration. A properly woven belt will be straight and constant in width and thickness. This can be quickly ascertained by unrolling the belt, which should lie in a straight line. Width and thickness can be checked by means of a rule and sliding calipers. The belt should be flexible to permit of the negotiation of small pulleys; this property can be gauged by flexing the piece between the hands. There should be also a protective edge to prevent fraying against guide forks or other obstructions.

These are all points which can quickly be ascertained at a glance, but there are many other technical considerations not so easily ascertained which had best be left in the hands of the expert.

With an assurance of quality of material and workmanship there now remains the application of the belt itself. A good belt has often been ruined by putting it on an unsuitable drive. It is always safe to go on the makers recommendation of H.P. capacity etc., but to cover completely the whole field of belting transmission in a single catalogue is obviously impossible. For this reason the larger manufacturers maintain a staff of experts at home and abroad who are always ready to give advice necessary for any particular drive.

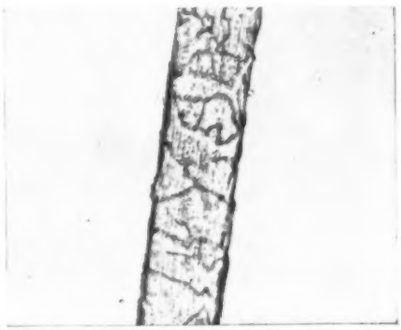

Photo-micrograph of Camel Hair magnified to five hundred times its original size.

One firm specializing in oilfield belting equipment has an organization covering practically the whole world, points out that advice is always easily obtained, as to which type of belt is most suitable for the particular drive and conditions encountered. A careful study has been made of the special requirements for drilling rigs, compressors, and all types of pumping units, as well as the complete refining plant including conveyors for mechanical handling.

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Federal Storage of Surplus Crude Oil

(Continued from page 371)

the separate owners drill and produce; the oil belongs to the person who brings it to the surface. Hence the race to produce even at a loss and the dissatisfaction with any system of artificial restraint of the number of wells that the surface owners may drill or the rate at which they may produce. Distrust of these systems is increased by the knowledge that they are affected by competing fields which are not subject to the same restriction.

In conclusion, it appears necessary that some action be taken immediately if the oil industry is to remain on a sound basis in the United States. Proration and unitization have been tried and found far from being entirely satisfactory; they probably will have to be replaced by some plan, fully workable under existing laws which today permit legalized robbery of one's neighbor's oil when he curtails production from his wells.

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Rear Admiral J. Halligan and Oil Storage

IN a lecture on naval fuel reserves recently given by Rear Admiral J. Halligan before the Army Industrial College at Washington, D. C., he points out that the underlying purpose of the fuel reserves of the Navy is to provide within continental limits of the United States an assured supply for war time use. "Foreign sources of supply in war time," says the Admiral, "will be denied us unless we have command of the sea." He questions whether the industries of this country have a reasonable security of war time supply, and further expresses the opinion that sooner or later we shall depend largely on importations for domestic consumption.

Admiral Halligan also mentions the factors of cost changes in oil which have occurred periodically, and that there have been variations up to 300 percent in the price per bbl. of crude oil, and believe it will eventually cost three times its present price. He referred, furthermore, to the fact that Major S. M. Decker, Consultant Engineer to the Army Reserve Corp. has suggested that the Government, during the present period of over-production, buy large quantities of oil and store it in abandoned oilfields or mines; that in a recent issue of WORLD PETROLEUM (March, 1931) there is an account of the successful underground storage of crude and gas in depleted oil sands in California.

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THE Standard Oil Company of Venezuela's head office has been moved to Maturin.

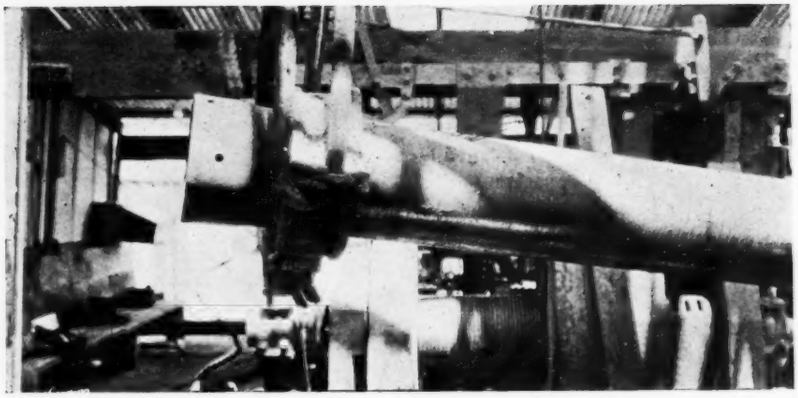

Fig. 1. Raising casing before fabricating the surface section by arc welding.

Arc Welding for Oil Well Casing

Use of Portable Outfits Makes Electric Welding of Casing Practical in Any Oil Field and Facilitates Handling of Casing.

By J. F. Lincoln

President,
The Lincoln Electric Company

A NEW and improved method of joining surface casing of oil wells by the use of the electric arc welding process, which gives added strength and rigidity to the joints, and to the entire surface section of the casing, is now rapidly gaining favor in the petroleum industry.

This new type of construction, which substitutes arc welded bell and spigot joints for the old type, screw joints, simplifies fabrication of this casing. It also gives additional tightness to the joints, simplifies the driving of casing into the wells, and the salvaging of used casing from dry wells.

The method of lowering the casing, joined by arc welding, into the well is primarily the same as that used in lowering sections joined by the traditional methods. The casing is brought in over the well by a rigging especially designed for that purpose, as shown in Figure 1. The belled end of the section is raised and the spigot end is fitted into the bell of the preceding section. The first length of the surface section is fitted into a shoe as shown in Figure 2, and the joint is completed by arc welding in the same manner as the succeeding joints. This shoe, as well as the succeeding joints, has holes drilled through the bell for plug welds. These welds are not particularly important from the standpoint of strength, but they do give added rigidity to the joint.

Fig. 2. Fitting first length of casing into the shoe. Note holes for plug welding.

The casing is lowered into the well through a spider, as shown in Figure 3. It is then held in position by blocks as shown, and the spigot end of the succeeding section is inserted in the bell as shown in Figure 5. As soon as the joint is in place welding begins. Since speed is essential, two to four operators are used in welding each joint. The three men shown in Figure 5 are ready

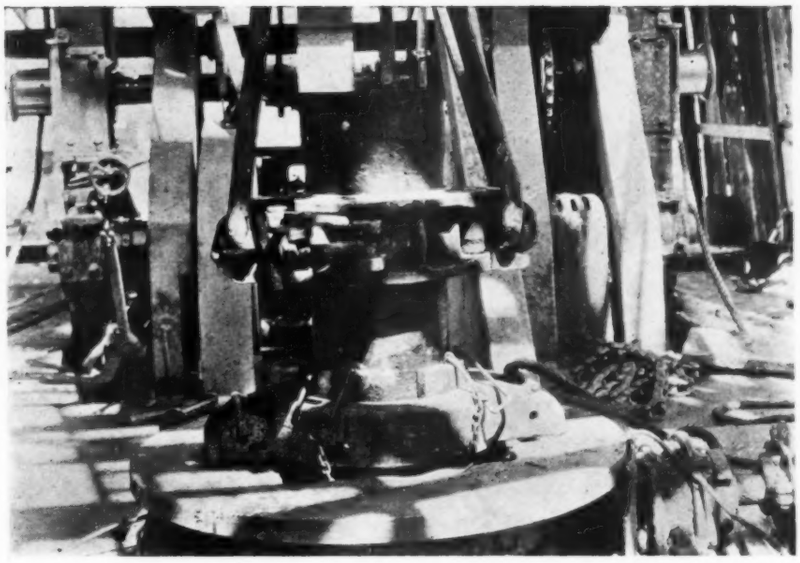

Fig. 3. Section lowered into well ready to add another section.

to begin work on the joint shown. As each joint is completed the casing is lowered into the well, and the procedure repeated until the entire surface string is in place. These strings vary in length from 500 to 1,600 feet, depending on drilling conditions.

In welding the joints of the casing not only speed, but exceptional strength and rigidity in the joints, as well, are of the greatest importance. Speed is required in order to effect the least delay in getting the casing into the well. For this reason ¼ inch welding electrodes, and a welding heat of 250 to 300 amperes are used to increase the speed of welding. To attain maximum strength, additional metal is sometimes fed into the arc in the form of a filler rod.

This maximum strength of welded joints is necessary to withstand "plugging," which consists of raising the string of pipe and dropping it into the well succesively, to remove obstructions which are sometimes encountered in the hole. At times this must be continued for several hours in order to force a path for the casing. At other times it is necessary to pull a string of this casing from the well, due to the impossibility of removing an obstruction by "plugging." In such cases the string extends a hundred feet or more into the air when removed. Yet, to date not one weld failure has occurred in the many times this has been done. Only the very highest quality casing and welds will withstand this rough treatment. The casing shown in the accompanying illustrations was manufactured by the American Seamless Tube Corporation of California and the welding was done by the Irwin Welding Works.

Fig. 5. Preparing to weld the joint. Note how casing is held in spider.

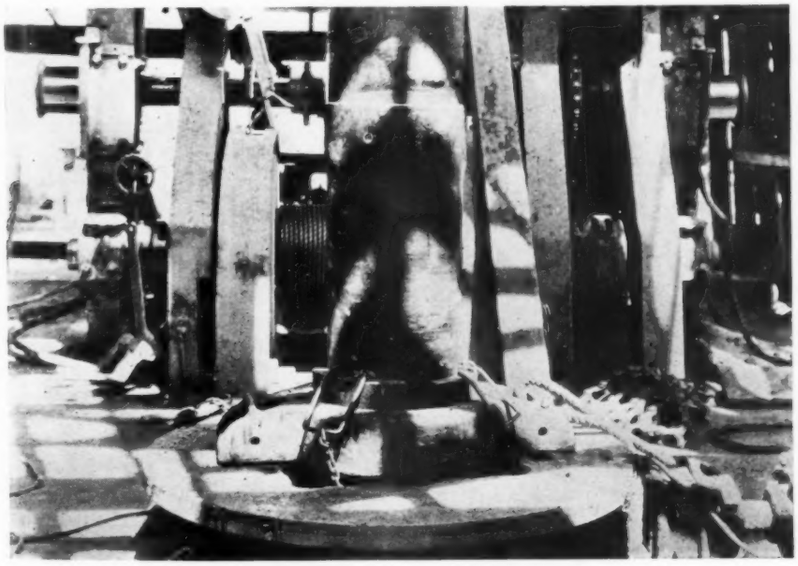

Fig. 4. Joint ready for electric welding.

The welding current used in fabricating the casing was furnished by "Stable Arc" welders manufactured by The Lincoln Electric company. These welders are mounted on trucks for mobility, and are moved from one well to another as work progresses. One large truck generally carries four "Stable Arc" Welders. Smaller trucks carry oxy-acetylene equipment for cutting, where necessary.

This new method of joining oil well casing has many advantages over the screw type. The casings are easier to handle and run, the joints are stronger and more resistant to corrosion than the threaded joints, and the joints are tighter. It is also easier to fabricate a slip joint on large sized tubing for arc welding than to assemble and thread these sections.

Problem of Fuel Oils for Diesel Engines

Review of Interesting Paper Read Before Institute of Petroleum Technologists by L. J. LeMesurier and R. Stansfield of the Anglo-Persian Oil Company of London.

It is now well established that Diesel engines can be built that will operate successfully on petroleum products ranging from the kerosene fractions to heavy residuals, and even on coal tar and such substances as vegetable oil. In other words, nearly any sort of oil is a good fuel for a Diesel engine of a particular type, provided that the engine is one of large power that runs at constant speed, and where conditions of operation are such that harmonious relations between the engine and its fuel can be established by regulation of the air-blast pressure or by adjustments of the fuel injectors.

The use of the heavy-oil engine is showing an increasing tendency to expand into a wider field. Users of small power units in marine, traction, and small stationary power plants operating on gasoline or kerosene are becoming more disposed to avail themselves of the superior economy offered by the lower priced, heavy-oil fuels. There is also a tendency to demand higher speeds of Diesel engines, and airless injection is coming into general use. The whole present aspect of the situation calls for more exact information regarding fuel characteristics and fuel behavior under engine operating conditions. The small high-speed engine is frequently called on to work under less favorable conditions than the larger type. Wide variations in speed and load may be necessary—as in the case of a vehicle engine and the small size of the unit makes it impractible to give it the skilled attention that can be devoted to learning the requirements of the larger plant.

The builders and users of internal combustion engines of the Diesel type are, therefore, confronted with the problem of finding means of determining the behaviors of oil fuels in large and small sizes of both slow and high speed Diesel engines. Furthermore, refiners have the task of producing and marketing a fuel that will be generally acceptable to both engine manufacturers and users, so as to reduce high storage charges necessitated by carrying several grades of oil in stock. The usual method of studying the relations between an engine and its source of power is by indicator diagrams; but owing to the special technology of the Diesel engine the ordinary type of piston mechanical indicator has its limitations.

Means for acquiring this information have been made the subject of an important research by Le Mesurier and Stansfield. In this investigation diagrams were obtained from four types of Diesel engines by means of a Farnboro electrical indicator. Each of these four engines (Petter, Junkers, McLaren-Benz and Robey) was tested on 14 different fuels ranging from distillates to residues with paraffin or asphalt bases, and blends and mixtures of these.

The program of work included an examination of fuel consumption, fuel system leakage, the combustion process from the point of injection through the delay period to the beginning of expansion, combustion shock (knocking), ease of starting, the effect of dopes (anti-knock mixtures), the effect of nozzle alterations, and the effect of changes of speed in relation to combustion and shock.

While the experts who conducted this investigation regard their results as first approximations, it appears to be very clear that the differences in performance shown by the diagram in the original tests are largely due to the nature of the fuels used and not to any easily controlled engine detail. In fact, the relative independence of certain aspects of fuel behavior from design was an unexpected result of the research. All the engines consumed very nearly the same amounts of each of the 14 fuels, from which it may be concluded that a fuel that burns well in one type of Diesel engine will burn equally or nearly as well in the other types. From the standpoint of the Diesel engineer this result is of practical importance, because fairly accurate information can be obtained as to how a given fuel may be expected to behave in any engine. When the method is further perfected it should be possible to purchase Diesel oils by specification.

The chief differences in oils to be looked for by the new method are the length of the "delay period," or the time between injection and the beginning of pressure rise; it may be measured in terms of crank angle. The magnitude of this angle expresses with what smoothness the oil may be expected to burn in the combustion chamber—whether its power will be gradually and effectively developed, or whether its force will be more or less wasted by rapid burning with an accompanying more or less alarming knock.

This investigation appears to warrant the deduction that each Diesel oil, like the lighter distillates, has its own characteristics as regards delay angle for different cylinder pressures (and therefore temperatures) at the moment of injection. In general the delay angle decreases as the injection is retarded owing to the higher temperature at the moment of injection, and this higher temperature causes a higher velocity in the initial reaction preceding inflammation.

All these particulars show up on the Farnboro indicator; each oil can be made to trace its own curve on a diagram that will show when it begins to burn, and how its pressure is developed in relation to the compression and the dead center.

It is, therefore, say the experts, safe to prophesy that the rating of heavy oils for Diesel engines, just as for petrol engines, must include suitable engine tests. It can be stated with a fair degree of certainty that heavy oils obtained from crudes which give motor spirits of the highest anti-knock value will be the worst from the point of view of combustion shock in a Diesel engine, and that those from crudes giving relatively low anti-knock value straight run spirits will be comparatively good.

All the tests necessary for this extensive investigation were carried out in the laboratory of the Anglo Persian Oil Co.

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The July issue of WORLD PETROLEUM will be devoted to a complete survey of the world refining industry.

The Foreign Oil Legion

DONALD A. POPHAM, topographical engineer, Venezuela Gulf Oil Corporation, Maracibo, has left Venezuela and returned to the United States.

▼

HANS DETLEFS of the Venezuela Gulf Oil Company engineering department is an enthusiastic artist in his spare time. He sold many of the 21 paintings of Venezuelan subjects that he recently exhibited at the Gulf Terminal Club.

▼

BERT MEYERS, manager of the Tropical Oil Company in Colombia, is returning to that country following a vacation in the United States.

▼

R. B. JACKSON, representative of the Anglo Persian Oil Company in New York, has sailed for London on business as well as for a vacation.

▼

E. B. WOOD, Maracaibo representative of the Parkersburg Rig and Reel Company, Parkersburg, W. Va., has returned to the United States on a business trip that will last several months.

▼

PAUL ADAMS, manager, land department, Venezuela Gulf Oil Corporation, will return to Maracaibo after three months vacation in the United States.

▼

ARNOLD WILLIAMS of the Magdalena Syndicate recently returned to New York from England. The Magdalena Syndicate has extensive concessions in Germany.

▼

P. H. COOK, drilling superintendent of the Caribbean Petroleum Company, Maracaibo, Venezuela, recently returned to his home in California for a three months vacation.

▼

R. G. A. VAN DER WOUDE has been appointed President of the Shell Pertoleum Corporation, St. Louis, Mo., succeeding U. de B. Daly, resigned. Mr. Van der Woude has been associated with the Royal Dutch-Shell group for 25 years, having held positions in China, Mexico and Holland and so is thoroughly conversant with world affairs.

Eric Judd of the Martin Construction Company is well known to every oil official in Venezuela.

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W. R. FINNEY of the Lago Petroleum Corporation, who is in Venezuela supervising the electrification of his company's oil concessions, is due back in New York about the middle of July.

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CAPTAIN J. A. GOODWIN, manager in Trinidad of the British Controlled Oil Fields, Ltd., has returned to England. He wisely took care to ensure that his copies of WORLD PETROLEUM follow him. The accompanying snapshot of Captain Goodwin, whose home is in Instow, North Devon, was taken by the Editor when in Trinidad.

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C. S. HAMILTON, assistant to the vice-president, Venezuelan Gulf Oil Corporation, has returned to New York following a visit to Venezuela.

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JUAN BENNASAR, engineer of the Yacimientos Pet. Fiscales, Buenos Aires, Argentina, is spending several months in the United States for the purpose of studying production methods practiced in this country.

▼

ALFRED FISHER—research engineer of London and New York, has joined the staff of the Universal Oil Products Company of Chicago. He will carry on certain phases of research and development work in the petroleum industry. For the past five years Mr. Fisher has been a consulting engineer in New York, devoting part of his time to the Universal Company.

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DURING the last six months or so there has been an unusually large movement of oil men engaged in overseas oilfields and refineries. All changes of address should be sent promptly to either the London or New York offices of WORLD PETROLEUM, otherwise copies of the journal may go astray.

▼

Capt. Goodwin

U. S. Naval Fuel Oil Awards

UNITED STATES NAVY DEPARTMENT, on May 12, awarded a contract for 4,620,000 bbl. Grade B, fuel oil to the Shell Petroleum Company of California as the lowest bidder at $2,260,100. The oil must be produced in the U. S. A. and delivered to the Pacific Coast Navy Yards and naval stations.

The contracts awarded were as follows:

Company	Product	Barrels	Dollars
Shell Oil Co. of Calif.	Fuel Oil	4,620,000	2,260,100.00
Union Oil Co. of Calif.	Fuel Oil	216,000	204,620.00
Associated Oil Co.	Fuel Oil	160,000	95,250.00
Union Oil Co.	Diesel Oil	158,750	143,280.00
General Petroleum Co.	Diesel Oil	250	357.50
Total		5,155,000	2,703,607.50

During the fight for an oil tariff carried on by the domestic oil producers during the last session of congress, the only measure of relief came in the form of admendments to the naval and independent offices association bills, requiring the Navy and Shipping Board to purchase only such oil as was produced and refined in the United States even though it might cost more than the foreign produced oil.

Shell Petroleum being an American subsidiary of the Royal Dutch-Shell but a foreign-controlled concern, the award naturally aroused some comment especially in the mid-continent.

U. S. Production Review

	Daily Production bbl.	Daily Runs To Stills bbl.	Gasoline Stocks bbl.	IMPORTS Total Petroleum bbl.	IMPORTS Gasoline
Week Ending April 25.....	2,441,839 352,248*	2,432,900	46,451,000	1,263,000	241,233
Week Ending May 2.....	2,480,731 396,705*	2,399,300	45,613,000	1,785,000	290,995
Week Ending May 9.....	2,461,039 322,771*	2,326,400	45,810,000	1,377,000	260,000
Week Ending May 16.....	2,431,292 311,647	2,434,100	45,663,000	1,279,000	65,000

Underlines figures indicate improvement in statistical position—decrease in production, runs to stills, gasoline stocks or imports.

*** Production of East Central Texas—Rusk & Gregg Counties, the Van Pool, and few old fields. Rusk & Gregg accounting for all but 45,000 bbl.**

Crude Oil Prices

PRODUCTION of the Rusk-Gregg field, East Texas, reached its peak in the week of May 2, averaging around 350,000 bbl. per day. Partial proration succeeded in bringing this top figure down to about 275,000 bbl. per day, and further reductions to the allowable of 160,000 bbl. are anticipated. These developments served to stabilize somewhat the crude oil posted prices, while the importance of the East Texas field was further emphasized by the action of the Humble Oil and Refining Company (St. Oil N. J.) which reduced quotations elsewhere in Texas and also in New Mexico with the purpose of equalizing prices on the Gulf seaboard.

In Rusk-Gregg field the Humble Oil and Refining Company posted the regular Mid-Continent price schedule (43c for 29 deg. Be. up to 67c for 40 deg. Be. and above). Tidal Oil Company on May 9 reduced its original posted Mid-Continent prices to 40c flat per barrel, thus temporarily upsetting the market. This action was immediately counteracted by the Sinclair Oil Company which posted the regular Mid-Continent schedule similar to that of the Humble Oil and Refining Company. Just prior to the proration enforcement some oil was reported sold at 10c per barrel at the well, but if proration is enforced the prices will undoubtedly harden up very considerably. Current average price in Rusk-Gregg field is probably somewhat above 25c per barrel.

The Humble Oil and Refining Company's cut elsewhere in Texas, followed by other major purchasers, affected Southwest Texas fields (Yates, Winkler and others) where a cut of 5c per barrel was made, reducing the price to 35c per barrel; also Texas Panhandle fields where a cut of 10c reduced the price to 37c per barrel; also North Central Texas where a cut of 10c reduced the prices 10c below the Mid-Continent and East Texas schedules; also the Hobbs field in New Mexico where a cut of 7.5c reduced the price to 32.5c per barrel. Though all these cuts appear small in cents per barrel they represent a major cut of from 15 to 22 percent in the value.

On the Gulf Coast prices were reduced to 71c per barrel from the previous range of from 80 to 93c.

In Oklahoma, Kansas and California no changes were effected during the past month.

In Pennsylvania a minor cut of from 10 to 20c was made as follows: National Transit oil to $1.75 from $1.85 and the Eureka Pipe Line crude to $1.50 from $1.70.

In general the crude oil price structure depends largely on the success or failure of East Texas proration. A rough estimate of the direct loss caused to the oil industry by the East Texas discovery and consequent "flood" is amazingly large, being around $1,000,000 per day, or $360,000,000 for the whole year of 1931.

Texas Proration

THE Texas Railroad Commission issued several orders prorating the production of the Rusk-Gregg field, the first allowing a production of 90,000 bbl. per day, the second allowing 130,000 bbl. per day and the last allowing 160,000 bbl. per day. The first order was generally disregarded, the second was partially obeyed for one day only by some producers who seeing their neighbors producing offsets fully open were forced to protect themselves by re-opening their wells, while the third order allowing the production of 160,000 bbl. is now being put into execution and apears to have a fair chance of being effective.

The reason for the apparent success of the present proration order is not the authority of the Texas Railroad Commission to enforce the proration, but rather sheer necessity. In the first place the water encroachment in the Central Kilgore Sector assumed alarming proportions, with about 20 wells producing salt water with the oil. In the second place the rate of new drilling developed a situation where most of the smaller operators were faced with the impossibility of selling their crude at any price, since the major companies were runing their own production only. Proration, if effective, assures all producers their pro-rata outlet for all wells—reffering to the Texas Common Purchasers (pipe line) law providing for ratable runs by all carriers.

The proration question, however, cannot be considered settled as yet. Considerable opposition is still encountered, especially since those who oppose its enforcement argue that the proration of the last two years did not succeed in maintaining crude oil prices, but served to build up large unreal potential figures, which have a continuous, depressing effect.

Several petitions seeking both temporary and permanent injunctions restraining the Railroad Commission from enforcing proration orders were filed recently by some of the smaller East Texas operators.

East Texas - Rusk - Gregg

DEVELOPMENT of the Rusk-Gregg field was considerably accelerated during the last month due to several extensions. In the middle of May the field, which is only five months old, had 450 producing wells, 420 active operations and around 100 locations, or a total of 970 projects; new locations exceeded 100 per week. The producing area has been fairly well defined, the total proven acreage having reached 86,000 acres. Total recovery of the field is estimated at between 430,000,000 and 860,000,000 bbl., basing the

estimates on 5,000 to 10,000 bbl. per acre recovery; accordingly a reasonable average figure at this time would be 645,000,000 bbl. total recovery, and 7,500 bbl. average, per acre recovery. The total length of the field is 35 miles, while the width varies from 2 to 6 miles. Because of the world importance of the Rusk-Gregg field, we deal with the latest developments in detail this month:

1. Extension of the producing area 2½ miles northeast from the North Longview Sector by the Eslick and Little No. 1 Nicholson, Marshall Man Survey, which was completed for 20,000 bbl. per day with the sand from 3,659 to 3,676 feet.

2. Extension of the producing area 2½ miles northwest from the North Longview Sector by the Mudge Oil Company's No. 1 Richardson, David Ferguson Survey, which was completed for 4,000 bbl. per day partly pinched in, with a total depth of 3,743 feet. This well extended production into the Upshur County. The Mudge Oil Company completion was followed by several others widening the extension and proving intermediate territory, and increasing the aggregate total potential production.

3. Sinclair Oil and Gas Company No. 1 Cole, Samuel Brooks Survey, widened somewhat the west edge of North Longview Sector, being estimated good for 25,000 bbl. per day, with the sand from 3,647 to 3,661 feet. This well is 2½ miles due south from the Selby Oil Company's well reported in the May issue of WORLD PETROLEUM. While being completed No. 1 Cole broke loose, caught fire, and after burning 193½ hours was extinguished with nitroglycerine shots, being shut-in one week later. The explosion claimed the lives of nine men.

4. Sinclair Oil and Gas Company completed two wells in the South Joiner Sector of the field extending production 1½ miles south and southeast. Its No. 1 Kinney, J. B. de Cadene Survey, was completed for 250 bbl. per hour at 3,675 feet, and its No. 1 A. S. Jarvis, Juan Vargas Survey, was completed for 230 bbl. per hour with the sand from 3,699 to 3,709 feet.

5. In the Central Kilgore Sector water encroachment assumed serious proportions, with around 20 wells producing salt water with the oil. Water appeared not only on the west edge of the sector, but also in its central portion. Some completions in proven territory produced nothing but salt water. To delay the progress of water the operators reached an agreement reducing production per well to 700 bbl.per day. Also

(Continued on next page)

World Oil Production Figures — Official

All figures furnished direct to World Petroleum by Governments, except where otherwise specified

(Conversion 7 bbl. = 1 ton)

Country	Total Production 1930 (revised) (Barrels)	JANUARY (Barrels)	FEBRUARY (Barrels)	MARCH (Barrels)	APRIL (Barrels)
UNITED STATES	896,265,000	65,991,000	60,645,000	69,397,000 (7)	71,500,000
VENEZUELA	141,652,832	10,579,707	9,806,034	10,705,814	9,597,784
RUSSIA & SAKHALIN	129,955,417	12,072,900	11,141,900	12,654,600	12,318,600
PERSIA	(6) 43,549,323	(6) 3,201,156	(6) 3,079,132	(6) 3,081,260	3,442,341
ROUMANIA	39,876,589	4,233,810	3,570,000	3,856,020	3,850,000
MEXICO	39,529,639	2,890,903	2,563,986	(9) 2,819,430	2,761,039
DUTCH EAST INDIES	38,722,250	(5) 3,226,854	(5) 3,225,000	(5) 3,200,000	(5) 3,000,000
COLOMBIA	20,343,176	1,657,694	1,565,425	1,774,865	1,467,429
PERU	12,445,888	986,902	662,022	1,131,155	(4) 914,342
TRINIDAD	9,419,804	821,523	744,518	844,534	798,134
ARGENTINA	9,001,671	898,007	796,578	(5) 740,000	(5) 800,000
INDIA (BRITISH)	6,936,315	662,604	635,743	703,568	(5) 575,000
SARAWAK	5,251,541	(1) 326,956	231,090	(3) 314,937	309,876
POLAND	4,645,550	390,600	350,700	381,500	357,000
JAPAN & TAIWAN	(5) 2,250,000	(5) 197,500	(5) 195,000	(5) 195,000	(5) 195,000
EGYPT	1,977,660	(1) 196,021	158,210	162,225	160,573
ECUADOR	1,596,238	137,531	120,145	126,544	117,768
CANADA	1,535,827	179,711	155,651	160,358	153,705
GERMANY	1,209,185	127,894	98,000	100,030	77,833
IRAQ	(8) 980,000	(5) 100,000	(5) 100,000	(5) 100,000	(5) 100,000
FRANCE	516,642	(2) 40,075	(2) 40,075	(2) 40,075	(5) 40,000
CZECHO-SLOVAKIA and Others...	(5) 220,000	(5) 25,900	(5) 25,900	(5) 25,900	(5) 29,000
TOTALS	1,407,880,547	108,945,248	99,910,109	112,514,815	112,565,424

[1] 4 weeks to February 6th.
[2] Official total, 1st quarter 120,225.
[3] 4 weeks to April 17th.
[4] International Petroleum Co. production was 720,810 bbls.
[5] Estimates.
[6] Anglo-Persian Company's figures.
[7] American Petroleum Institute estimate.
[8] Actual production in Iraq probably higher than official total.
[9] Official Figures Revised.

the Railroad Commission issued the following additional ruling: "Drilling of the pay formation must be done slowly and carefully, and operators are hereby ordered to refrain from drilling the maximum amount of pay, and hereafter drilling operations in every well must be stopped at a safe distance above the water level shown by the geology of the area in which the well is located."

6. Trunk pipe line construction kept pace with field development. At this time the following lines are operating and are nearing completion: Atlas Pipe Line Company to Shreveport, La., 8 inches, 25,000 bbl. capacity; Arkansas Pipe Line Company to Shreveport, La., 8 inches, 25,000 bbl. capacity; Gulf Pipe Line Company connecting link to its Mid-Continent-Gulf Coast trunk line, 6 and 8 inches, 40,000 bbl. capacity; Humble Pipe Line Company connecting link to its Van-Shreveport, La. trunk line, 8 inches, 24,000 bbl. capacity; same company's conecting link to its Boggy Creek-Gulf Coast trunk line, 8 inches, 20,000 bbl. capacity; Magnolia Pipe Line Company connecting link to its Arkansas-Beaumont trunk line, 10 inches, 32,000 bbl. capacity; Sinclair-Texas Pipe Line Company line to Mexia, connecting with Prairie Pipe Line Company trunk system to Gulf Coast and also North, 12 inches, 50,000 bbl. capacity; the Texas Pipe Line Company conecting link to its Corsicana-Gulf Coast trunk line, 10 inches looped, 50,000 bbl. capacity. Total trunk pipe line capacity is accordingly 266,000 bbl. per day.

7. Operators also greatly increased capacities of their tank car loading facilities. To-date there are, in the Rusk-Gregg field, 42 loading racks with a total capacity of 1,619 tank cars. About 200,000 bbl. are moved out in tank cars by railroads, and if proration is not enforced that figure can be increased to 250,000 bbl. per day.

8. Small, local refineries, built and building, will be consuming 45,000 bbl. per day, indicating a total outlet for the Rusk-Gregg field of over 550,000 bbl. per day within a very short time, the current maximum outlet being around 400,000 bbl. per day.

9. Total steel storage built and building includes 57 tanks with a capacity of 3,736,000 bbl.

10. Total recovery of the field to the middle of May reached 16,000,000 bbl., indicating an approximate gross return to the operators of $3,500,000.

11. The very active wildcatting campaign around the Rusk-Gregg field including the Upshur, Marion, Harrison, Morris, Nagodoches, Cass and Cherokee counties continued without any favorable indications whatsoever.

California—Ventura

THE Associated Oil Company's No. 57 Lloyd was completed for 5,500 bbl. of 30 deg. Be. oil and 4,500,000 cubic feet of gas, with the total depth of 8,823 feet, thus making it the deepest flowing producer in the world. The 5 inch perforated liner was set from 7,012 to 8,823 feet. This discovery of a deeper producing horizon in Ventura field greatly increased the potentiality of the field, the estimated increase of oil reserves being 50 percent (estimated appreciation in value, $70,000,000). The total proven area in the Ventura field is 1,500 acres, the two major operators being the Shell with 770 acres and the Associated Oil Company with 650 acres.

California—Lost Hills and North Belridge

FURTHER development of the Temblor Zone in Lost Hills and North Belridge fields was very disappointing—the Lost Hills deep test not showing any commercial oil, while the second deep test in the North Belridge field (Union Oil Company's No. 17 Belridge) made but 250 bbl. in 20 hours from 5,541 feet.

Oklahoma—Oklahoma City

THE Corporation Commission completed potential tests of the Oklahoma City field, final potential being 7,864,659 bbl. per 24 hours from 763 wells, based on four hour test gauges. The allowable has been increased to 175,000 bbl. per day. The potential is distributed as follows: Arbuckle Limestone, 104,458 bbl. from 122 wells, or 855 bbl. average per well; Lower Simpson Sands, 2,046,621 bbl. from 430 wells, or 4,760 bbl. average per well, and Upper Simpson Wilcox Sand, 5,713,580 bbl. from 211 wells, or 27,200 bbl. average per well. Estimated reasonable potential after a very short period of open flow would probably be 1,500 bbl. per well from the Lower Simpson and 4,000 bbl. per well from the Wilcox Sand, or a total estimated reasonable potential of about 1,500,000 bbl. per day.

Kansas—McPherson County

DEVELOPMENT of this limestone producing area, including Ritz, Garrett, and Decker fields in McPherson County, was somewhat accelerated during the past few months. Oil and gas production in these fields is derived from the Mississippi Limestone ("Chat") and from Viola Limestone at around 3,400 feet. Forty-two completed oil wells have an estimated potential of 64,000 bbl. per day, while their allowable is 6,300 bbl. The 32 completed gas wells have an estimated open flow potential of 500,000,000 cubic feet per day. Shell Petroleum Corporation is the largest lease owner in the area, but instead of developing the leases itself, it sub-leases to small producers, retaining an overriding royalty interest. While not a major area of national importance the McPherson County fields will produce considerable amounts of crude oil and natural gas.

BASIL B. ZAVOICO.

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U. S. SOVIET RUSSIA PRODUCTION REVIEW

Crude Quotas Revised

THE Soviet Oil Trust has decided to revise again the quotas of crude production for the last two years of the Five-Year Plan. The new plan has set the definite quantity of 275,000,000 bbl. of crude oil and gas for 1932, and has changed the quota of 1933 from 331,000,000 bbl. to 350,000,000 bbl. In 1934 the output is to be 450,000,000 bbl.

In order to make clear the great task before the Trust, it may be well to quote here the petroleum results for April, 1931, which are the latest figures available, and which are given WORLD PETROLEUM officially in metric tons.

Crude production	12,318,600 bbl.
Runs to stills	10,569,300 bbl.
Drilling completed	29,127 ft.

For uniformity the usual conversion

ratio of one ton to seven bbl. has been taken, although for Russian crude, 7.25 bbl. would be more accurate, which would give an actual production of 12,678,550 U. S. bbl.

To render possible the attainment of the new production objective without any appreciable increase of cost of drilling, permission has been given to direct most of the drilling activity to the proven oil areas, and to break in for greater depths where it is hoped the horizons will prove more prolific. General drilling speed per rig per month has to be increased from the present rate to 700 feet in 1932, and to 950 feet per rig per month in 1933. In the meantime wildcatting, and exploration of new oil areas, will be carried on with a view to insuring a production of 450,000,000 bbl. of crude in 1934.

At present, plans are being worked out for the refining of oil and gas in 1933, with ample provisions for the accumulation of sufficient stocks for both domestic consumption and export. During 1932 various tests and research will be carried on for deep cracking and hydrogenation of oil; in 1933 high capacity cracking units will be built, as well as hydrogenation plants on a commercial basis. Capital investment for 1932 will amount to 600,000,000 rbls. ($300,000,000); in 1933 to 900,000,000 rbls. ($450,000,000). It is also planned to reduce cost of production and refining by 12 percent in 1932 and by an additional 10 percent in 1933.

Address by Ganshin

At the All Russian Oil and Mining Conference which took place in April at Baku, Sergius Ganshin, Chairman of the Soyusneft, stated that "crude production for the first quarter of 1931 exceeded the figure for the same quarter of last year by 37 percent." None of the Oil Trusts with the exception of Uralneft, however, has fulfilled its production quota as set by the plan for the year. Uralneft has exceeded its quota by 41 percent (according to the plan for 1931 all other fields, including Ural, have to produce 420,000 bbl. during the year). All other oil trusts fulfilled their quotas as follows:

Percentage of Quota Fulfilled

Trust	*Percent*
Azneft	91
Grozneft	88
Emb'neft	89
Maikop	58
Middleasia	36
Sakhalin	71

Average for all trusts amounts to 91 percent of the plan for the year. Refining done by all oil trusts for the first quarter of the year amounted to 95 percent of the plan and only about 82 percent of the drilling plan was completed.

Mr. Ganshin also referred to the revised quotas of production for the remaining two years of the Five-Year Plan. He pointed out that Azneft will produce 145,000,000 bbl. of crude in 1932 and 168,000,000 bbl. in 1933, while the quota for Grozneft will amount to 75,000,000 in 1932 and 87,000,000 in 1933. He further stated that the only deviation from the policy of building will consist of the change to spread the net of plants and refineries all over the country so as to have them nearer to the main points of consumption. In all other respects construction plans will be carried through as before, but the manufacture of lubricating oil will be entirely reorganized. Under new "pipeline work to be started in 1931," there is the Armavir-Nikitovka line which will be completed in 1932, and lengthened by a Maikop-Armavir extension, and later carried from Armavir to Liski. This line was not shown on the map published on page 316 of May WORLD PETROLEUM, as the announcement for its construction had not then been made.

Grozni in 1931

CRUDE production for Grozneft has been set at 69,000,000 bbl. for 1931 of which new fields will furnish 91 percent and the balance will be derived from the old fields. Production of gas will amount to 317,000 tons against 218,000 tons last year; the quantity of absorption gasoline therefore will amount to 94,000 tons (71 percent increase) and the drilling will amount to a total of 3,765,000 feet. Further electrification of production amounting to 96 percent of the total (72 percent, 1930) will be undertaken in 1932. An increase of labor employed, which will bring the total employed up to 14,700 men, is also planned. The increase of labor will be absorbed almost entirely by all auxiliary enterprises as well as by exploration, transportation, etc. and the average wage will amount to 102 rbl. per month, against 90 rbl. during last year.

Sakhalin in 1931

SOYUSNEFT has appropriated 14,790,000 rbls. for various expenditures during 1931 at Sakhalin where the following drilling program is in operation; wildcatting 13,200 feet at a speed of 250 feet per rig per month; exploration-exploitation drilling 6.600 feet at a speed of 350 feet per rig per month; exploitation drilling 20,000 feet at a speed of 400 feet per rig per month. Work is to be started immediately on the second refinery for Sakhalin (apparently the refinery planned at Vladivostock is for export) in order to ensure its operation in 1932.

Sakhalin plans indicate shipments to Khabarouski of about 500,000 bbl. of crude during 1931 and 1,500,000 bbl. during 1932, for refining. Other building projects to be undertaken at Sakhalin include the building of the pipe line from Okha fields to the sea-port at Moskalvo. The line will be 10 inches instead of 6 inches as formerly planned.

Internal Consumption

ACCORDING to official figures, internal consumption in the Soviet Republic during the last, or shock, quarter of 1930 amounted to 21,308,000 bbl. This figure represents an increase of 5.3 percent over consumption for the same quarter of 1929 and falls 4.1 percent under planned consumption for this period.

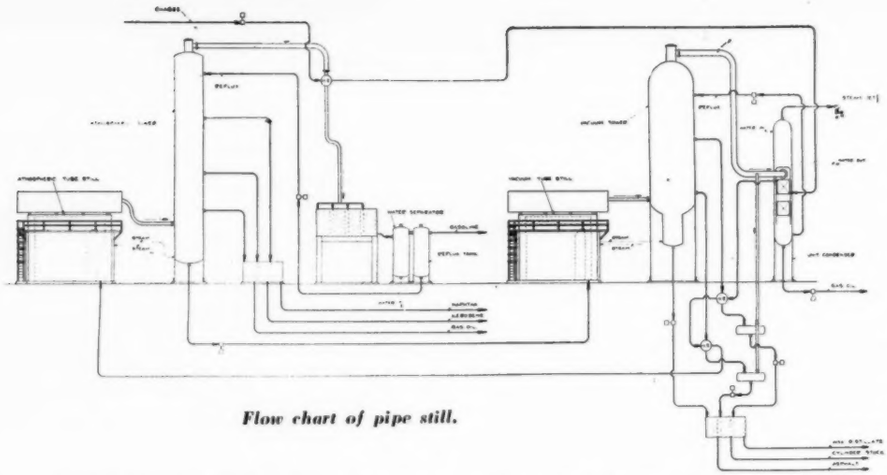
Consumption by Individual Products

Product	*Barrels*
Fuel oil	13,600,000
Diesel oil	1,840,000
Kerosene	4,200,000
Gasoline	450,000
Ligroin	225,000
Black lubricating oil	365,000
Machine oil	161,000
Automobile oil	112,000
Special oils	355,000
Total	21,308,000

Increases over last year occured principally in tractor and motor car lubricating oils (84 percent) and in gasoline (68 percent): all other products showed an increase of approximately 0.36 percent. Consumption of kerosene by the general public was off two percent, although total consumption of kerosene increased 7.2 percent over the same quarter, 1929.

Azneft Refining Capacity

A SURVEY of the total refining capacity of the Azneft on April 1, 1931, showed that the operating plants at Baku have a refining capacity of 63,000,000 bbl., while those at Batum have a capacity of 19,250,000 bbl. per year. The pipe still of Russian design and manufacture which is expected to be in operation during the summer of this year at Baku, the four Foster Wheeler plants, and the eight cracking units of various types which are also expected to be in operation sometime this year at Batum, will furnish, if taxed to utmost capacity another 10,000,000 bbl.



Flow chart of pipe still.

This addition would bring the total in both places up to 91,000,000 bbl.

This capacity, according to the report, is insufficient to cover refining output required by this year's production plans. Lack of refining capacity might also jeopardize refining plans for 1932, especially as new construction commenced this year for completion in 1932 has been curtailed. It has been limited to two lubricating oil plants, two kerosene-lubricating stills, two kerosene stills, and four cracking units. In view of enlarged production plans, requiring a proportionate increase in refining capacity, representations have been made by Azneft to the Soyusneft to increase the appropriation for construction of plants and equipment during the period 1931 to 1932.

Equipment for Grozni

THE Alco Products Company a division of the American Locomotive Company, and successors to Heat Transfer Products Company, was recently awarded a contract by the Amtorg Trading Company for two refinery units for Grozneft at Grozni, Russia.

The contract calls for an atmospheric and vacuum twin unit of a general type pipe still with multi side stream towers to process a mixed base crude oil of approximately 36 to 38 deg. A.P.I. for the recovery of 16 to 25 percent of gasoline (depending of the end point desired), kerosene, gasoil distillates, pressable paraffin distillates for production of light lubricating oils, and centrifugal overhead cylinder stock for the manufacture of bright stocks. The residue will be a low percentage asphalt.

The recovery of the light fractions will take place at atmospheric pressure, and the recovery of lubricating oils under high vacuum. In order to produce high quality products at the lowest possible thermal decomposition, consideration has been given throughout the design for operation at low temperature.

Each unit of the twin refinery is a two-stage atmospheric and vacuum crude distillation plant for the refining of paraffin base crude. Crude is taken from storage at atmospheric pressure and pumped through the vapor heat exchanger on the atmospheric stage. From there it is carried through vapor and side stream exchangers at the vacuum stage, and thus preheated, it enters the atmospheric pipe still.

At the still it consecutively flows through the convection section and radiant section of the roof tubes, and then passes on to the atmospheric fractionating tower. The latter has been designed to yield the recovery of gasoline as vapor from the top, with liquid side streams of naphtha, kerosene and light gasoil.

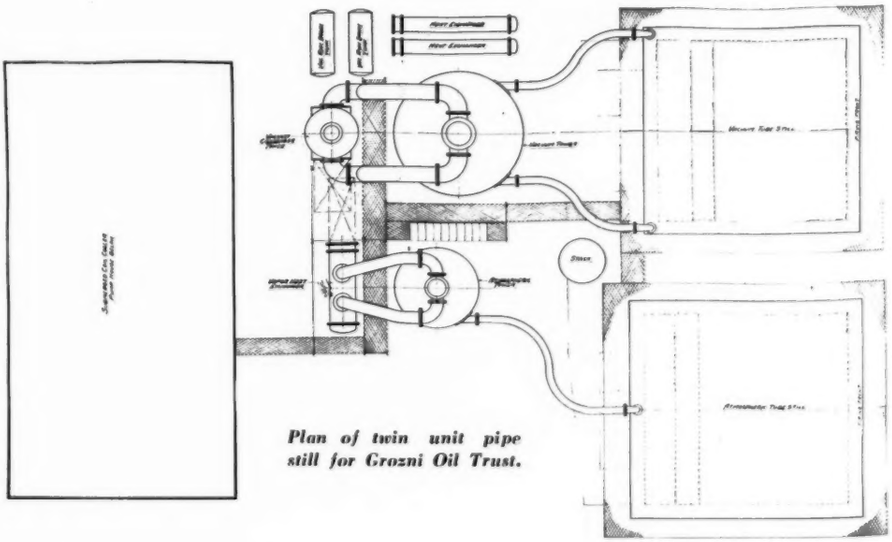
From the atmospheric fractionating tower the hot, reduced crude bottoms are pumped consecutively through the convection and radiant sections of the vacuum pipe still, and pass on to the vacuum fractionating tower. This tower has been designed for the continuous removal of overhead gas oil, liquid side streams of pressable wax distillate and overhead cylinder stock. The residue, which is an asphalt, is pumped from the bottom of the tower to a cooling coil and removed to storage.

The tower of the first stage operates at atmospheric pressure. The overhead gasoline vapors, as well as the process steam pass the vapor heat exchanger and enter a submerged cooling coil. At this point the liquid flows to a water separator that removes the condensed steam. Next it passes a reflux makeup tank, which is manifold to the suction of the reflux pump, and the final yield flows by gravity through the cooler and sight glasses to the storage tanks.

The vacuum fractionating tower operates at low absolute pressure, which is dependent upon the based cooling water. A steam jet air pump maintains the vacuum in the tower and balances the pressure in the vacuum rundown tanks. The vacuum on each stream can be broken through separate distillate pumps, which forces the finished products from the vacuum rundown tanks through the coolers and sight glasses to storage.

From the vacuum fractionating tower the gas oil and steam are removed as overhead vapors, and pass through vapor heat exchangers and vapor condensers. The oil vapors are condensed and collected in an intermediate vacuum distillate tank, and the steam is condensed in the barometric condenser.

Side streams of pressable wax distillate and overhead cylinder stock are taken directly from the tower. They run by gravity through the heat exchangers to separate rundown tanks.



Plan of twin unit pipe still for Grozni Oil Trust.

The input of crude to each still is automatically regulated and the top temperature of each fractionating tower is controlled by pumping a portion of the condensed vapors over the top plate in order to maintain a specified end point on each stream.

The exhaust steam from the pumps is again introduced into superheaters located in the settings of both stills, which is again used as a superheated steam in the process of refining at the fractionating tower.

It is expected that both units will be shipped from this country to Soviet Russia some time during the summer and may be in operation late in the fall of this year.

The contract cost of the equipment is approximately $1,000,000, and the total investment will represent $1,500,000, as all materials such as standard fire and red brick, stacks, auxiliary tankage, foundations, and reinforcing material will be supplied by the Grozni Oil Trust in Russia, as well as labor.

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Mexican Oil Activities

The Month in Mexico

CONSIDERABLE activity has characterized the past month in the Mexican petroleum industry; activity consisting of a report presented to the First National Judicial Congress by a committee that has been studying the Petroleum Law of 1925; confirmation of the report that several large Chilean companies are seeking concessions in the Isthmus of Tehuantepec; announcement of plans for a new oil refinery near Mexico City, the bringing in of a big gas well, and a statement giving June 30 as the date for the completion of the Palma Sola-Mexico City pipeline.

The Mexican Ministry of Finance has announced that Government income from petroleum taxation during March is one of the lowest on record, amounting to only 319,665 pesos (approximately $159,833). Of this income, 234,956 pesos ($117,478) were derived from taxes applied to production, the balance coming from export taxes.

A further statement from the Ministry placed the revenue from taxes applied to gasoline production at 1,444,877 pesos (approximately $722,438) for the month of March.

An indication of a further decrease in revenue for April is contained in a comparison of the official production figures giving crude production for April as 2,761,039 bbl. against 2,819,430 bbl., the revised figure for March.

Construction

PLANS are being laid for the construction of a large gas oil refinery in Mexico City by a group of Tampico capitalists headed by Guillermo Alonso, an outstanding petroleum engineering expert. The project is receiving the support of the Ministry of Agriculture.

S. D. Baker, general manager, Martin Construction and Engineering Company, has announced the expected completion by June 30 of the 223 kiolmeter pipeline running from Palma Sola, Vera Cruz, to Mexico City. The pipeline is being built for the Mexican Eagle Oil Company, with completion planned for the same time as the large refinery that the Mexican Eagle is building in the suburbs of Mexico City.

Work on the pipeline is being pushed forward rapidly by a gang of over 1,000 Mexicans completely supplied with trucks, tractors, and other modern equipment, as well as 150 mules. They are under the direction of W. J. Breeding and W. P. Dart. This is a welded line with seven pump stations and 21 receiving and storage tanks, and the capacity will be about 10,000 bbl. per day.

Mr. Baker considers this pipeline to be the most difficult construction job of its kind in Mexico. As mentioned in WORLD PETROLEUM some months ago, much of the line traverses mountainous country. There is one almost sheer drop of 1,353 feet and another of 1,245 feet, while 300 feet drops are frequent. It holds the record of being the highest oil pipeline in the world. Starting from 100 feet above sea level it attains an elevation of 8,140 feet at one point.

Production

A HIGH pressure gas well with an estimated production of 15,000,000 cubic feet per day has been brought in by the San Juan Drilling Company near the borders of the states of Nuevo Leon and Tamaulipas. It is reported that the Caribbean Gulf Petroleum Company is sinking wells near Campoton in the state of Campeshi. If oil is produced in commercial quantities it will open up a new petroleum zone.

Contracts aggregating more than 1,000,000 pesos (approximately $500,000) have been awarded to David Beveridge, driller, by the Inter-Continent Oil Company of New York and a Mexican wildcat enterprise. Mr. Beveridge, former Texas and Oklahoma driller, is expected to drill no less than 16 wells on both sides of the Tonala River in the States of Vera Cruz and Tobasco. Those in the state of Tobasco will be in what is known as the Zuayua tract, and the area is controlled by a Mexican company headed by General Fortunato Zuayua.

Ministries of Foreign Relations and of Industry, Commerce, and Labor, have confirmed a current rumor to the effect that several large Chilean petroleum companies are seeking concessions with a view to drilling wells in the Tehuantepec zone, whence they wil construct a pipeline to the Mexican Pacific Coast.

Judicial Congress

INTEREST has been aroused by a report on the Petroleum Law of 1925 submitted to the First National Judicial Congress by Matias Ochoa and Santiago Roel. Among other things the report urged modification of the law to accomplish nationalization of subsoil and limitation of exploration.

The Judicial Congress, which is a conference of lawyers, is meeting in Mexico City. Matias Ochoa and Santiago Roel are attorneys specializing in petroleum law and constituting a committee to study the law of 1925.

The Judicial Congress has drafted an ammendment to the petroleum law which will require all companies to set aside funds for the purpose of compensating individuals, other than company employees and officials, for any injuries or damages that they may suffer through petroleum exploitation.

DOUGLAS GRAHAME

SHIPPING

London:

TANKER operations since these notes were last compiled have been characterized, apart from the continued depression in the freight market, by a number of casualties. The Swedish tanker CASTOR after having been seriously on fire, so much so in fact that it looked at one time as though she would have to be abandoned, eventually arrived at Ponta Delgarda with her engine-room and aft part of the vessel gutted. She is now written off the active list for some time which fact, small though it is, may go towards providing work for another tanker which is without charter.

The tanker WELLFIELD has been ashore on the Bosphorus and has had to discharge 48,000 bbl. of benzine from her cargo. Fortunately it was possible to raise steam on the auxiliary boilers in order to work the cargo pumps. It was impossible to free the vessel of gas while she was stranded, and consequently every precaution had to be taken to safeguard against accidents. The ship's pumps cleared the engine room and later kept the leakage under control. She is a vessel of 7,800 tons deadweight owned by Hunting and Sons, Newcastle-on-Tyne and completed in March, 1924. The tanker LUCERNA owned by H. E. Moss and Company, Liverpool of 6,556 tons, gross, bound from Singapore to Dunedin with a cargo of benzine, stranded on Angelica Reef. She was refloated after about 4,600 tons of the cargo had been jettisoned. The vessel was slightly damaged.

The tanker MEGARA, owned by a subsidiary company of the Anglo-Saxon Company, has recently completed her twentieth round trip between Curacao, Thameshaven, and Rouen. It is estimated that since her completion she has covered a total of somewhere in the neighborhood of 180,000 miles. Throughout the ship has proved a complete success both as regards her hull and her machinery. She was the first tanker to be fitted with continuously supercharged four cycle Diesels. When running light she has a speed of over 13 knots, and loaded a speed of about 12 knots. This system of propulsion is being adopted for the whole of the Anglo-Saxon Company's new tanker programme of 10,000 ton twin-screw fast tankers, the first of which, a Dutch-built vessel, is expected to be due for completion some time in July. The MEGARA usually takes about 16 days from Curacao to Thameshaven and goes out from Rouen to Curocao in 14 days. She brings to Thameshaven mixed cargoes and her loading is generally so arranged that she discharges sufficiently at Thameshaven to enable her to proceed with ease up the Seine to the oil depot at the French Port.

Contracts, Launchings Completions

THERE is no new construction to be reported and no orders have been placed of any importance during the last few weeks, except that the order for a small coastwise tanker for the National Benzole Company has been given to a barge and dredger building yard, the Rowhedge Iron Works of Colchester. This ship is to be just a small vessel and there has been considerable competition to secure the order. It is currently thought in shipbuilding circles that the contract has been placed with this small yard because its lack of overhead has enabled a more than usually attractive constructional price to be offered.

The contract for the Burmah Oil Company's 6,000 tonner concerning, which very early notice was given in these columns, and as reported last month has been placed on the Tyne with Swan Hunter and Wigham Richardson. This ship is to be a steamer of about 12¾ knots service speed on a draft of 21½ ft., and is especially designed for service in the tropics.

Tanker Moordrecht with her streamline superstructure.

A number of interesting vessels have been completed, foremost among which are two Isherwood system tankers, built in Holland, by the Rotterdam Dry Dock Company, with British engines, the MIJDRECHT and the MOORDRECHT. These are interesting because of some rather novel features in the design of their superstructure, the whole of which has been streamlined, thus giving the vessels a most unusual appearance. The ships have a deadweight capacity of 10,130 tons each with dimensions 438 ft. x 58.5 ft. x 34.9 ft. Although the ships have been built in Holland for the van Ommenen interests, they are engined with British engines, the Harland—B. and W. unit being used, and in each case an eight-cylinder single-acting four-cycle is fitted, having a total horsepower of 2,750. The ships are intended for service to the Black Sea and viewed end on, present the most extraordinary appearance. Just what the idea of this streamlining is, it is a little difficult to say unless it is thought that such streamlining will result in a reduction in resistance. This could be understood if the ships were high speed units, but it is rather more difficult to understand in the case of a relatively slow speed ship. The hull is divided into 21 cargo tanks with a pump room between No. 4 and 5 tanks.

Completion of these vessels seems to have taken place at rather a psychological moment as far as business in the Black Sea is concerned, for a review of the charter market since these notes were last compiled reveals that as far as clean oils are concerned a great deal of activity has been experienced in Black Sea loading in parcels ranging from 1.000 to 4,000 tons. As typical of these a large vessel has ben fixed from Russian Black Sea ports to U. K. Continent at 7/6d. May-June loading. A vessel of about 4,000 tons from these ports to two French Mediterranean ports has been fixed for 9/6d. May-June loading while a 9,000 tonner was also fixed to Vladivostock early in May at 16/9d. Tonnage from the Black Sea to U. K. Continent has recently been obtainable at 7/-. From the Black Sea to Durban a 8,500 tons maximum cargo was placed in May at a lump sum freight of £6,000. It is pointed out, however, with regard to clean oils generally that enquiry has been of a poor character owing to the fact that the bulk of the demand has been for small parcels. Business, how-

ever, has been very difficult in the opinion of Messrs. Davies and Newman, the oil and steamship brokers of London, owing to difficulty in arranging the various combinations of parcels. The MOORDRECHT was fixed last month for Constanza-French Atlantic about 5,200 tons at 7/- and Constanza-Preston about 3,000 tons at 9/-.

Italy recently delivered her first tanker for Norway in the DRAFN, a 16,780 ton displacement ship constructed at Monfalcone for E. D. Aaley of Oslo. This vessel has a deadweight tonnage of 11,100 tons, and twin Fiat machinery designed to develop a total of 3,500 horsepower at 110 revolutions. The machinery in this ship is of special type.

Among the ships launched and delivered recently, mention should be made of the 14,500 tonner, PAN SCANDIA built for Leif Hoegh of Oslo. This ship is one of the largest tankers yet built on the Tyne and is propelled by a single two-cycle single-acting Diesel. Steam auxiliaries are used for the main cargo pumps and for the principal auxiliaries in the engine room and on deck.

The BRITISH STRENGTH, a 10,300 tonner of the British Tanker Company's latest programme was recently delivered to her owners by the Palmers of Jarrow. She is another single-screw ship with a Doxford opposed-piston engine of 2,850 h.p., while the 11,700 tonner, VARDAAS has been delivered by the Deutsche Werke to the Agdesidens Rederi A/S, Arendal. For auxiliary power the majority of British tanker owners and operators favor ordinary exhaust fired Scotch boilers; but this ship uses Clarkson thimble-tube silencer boilers for firing simultaneously with exhaust gas and oil. In as much as this installation differs from ordinary practice, it is worth comment. Each boiler is 4 ft. 3 in. in diameter by 13 ft. 9 in. high, plus 3 ft. 9 in., for the oil-burning chamber. The exhaust gas unit is designed to generate about 640 kg. of steam per hour, and the oil fired unit to generate 400 kg. of steam per hour.

A small steam tanker, the JOHN A. ESSBERGER, is now fitting out at the Deutsche Werft, and is worth comment because she is fitted with a triple-expansion superheated steam engine rated for 450 i.hp. The majority of coastwise type tankers today are Diesel propelled, except, those operating in the Gulf of Maracaibo.

Corrosion in Tanks

THE whole of the tanker fraternity has been considerably interested in the paper dealing with corrosion in tanks and tankers read by J. Foster King and J. L. Adam recently before the North East Coast Institution of Engineers and Shipbuilders. Mr. Foster King's work in connection with the British Corporation, of which he is chief surveyor, is well known and his observations are important in view of the necessarily mutual view point that they have. His paper went fully into the forms of corrosion and erosion likely to be met with in tanks used for the carriage in bulk of liquid cargoes under varying conditions of service. He and his fellow author drew attention also to the factors affecting the rate or extent of corrosion, the quality of material, protective coatings, and upkeep. He gave some particulars of the different corrosive effects of water, heavy oils, and spirit upon tank structure and cited details of actual cases. Attention was drawn to the association of durability and cost of maintenance with necessary freight charges, and therefore cost to consumers. The paper is particularly valuable to practical oil tanker men. It relates observed facts with probable causes and cures. It was designed to stimulate thought and discussion which would promote collaboration between chemists, metallurgists, builders and owners in efforts to promote a better knowledge of the causes and effects of corrosion and an improvement in the economics of the carriage of fluids in bulk. Space does not permit of going into this interesting paper in any detail but those people who are interested are advised to apply to the Secretary of the North East Coast Institution of Engineers and Shipbuilders, Bolbec Hall, Newcastle-on-Tyne.

New tanker British Strength.

Finance for Tankers:

THERE is indication that Scandinavian owners are still interested in the construction of tankers despite the present condition of the freight market, as loans are still being sought and granted. The Swedish Minister of Commerce for example, has recommended a loan of 250,000 kr. to the Svea Company as an advance for the construction of the motor tanker SVEABORG. According to a Norwegian source, Jolund Shipping Company of Moss has invited public subscriptions for an additional preference share capital of 600,000 kr. Ordinary share capital amounts to 550,000 kr., while the company is the holder of shares amounting to 753,000 kr. in a company that owns the 11,000 tonner HERBJORN at present running on a 10 years' time charter to the Anglo-Saxon Company at a net rate of £3,685 per month. The Jolund Company has now under construction at Burmeister and Wain's yard an 11,500 tonner due for delivery at the end of August, which has also been fixed for 10 years with the Anglo-Saxon Company at a net rate of £3,784 per month for the first five years and £3,644 a month for the remaining period. It is stated that the contract price including interest during the construction period was £168,950 of which the builders have granted a construction loan against first mortgage on the vessel for £108,400. A guarantee has also been secured for a second mortgage loan amounting to 500,000 kr.

The 2,852 ton (gross) tanker LEONOR built in Italy in 1928 at Monfalcone, and owned by the Curacaosche Scheepvaart Mij. of Willemstad, Curacao, D.W.I., has been transferred to the French flag and renamed SHELLPHALTE.

A. C. HARDY.

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American Tanker Launched

DURING the middle of May the third motor tanker built by the Sun Shipbuilding and Dry Dock Company at Chester, Pa., for the Standard Transportation Company, the shipping subsidary of the Standard Oil Company of New York was launched. Driven by Sun-Doxford opposed-piston Diesel engines, this new vessel is of 14,550 tons d.w.c., and carries 112,675 bbl. at a speed of 11 knots. She was christened DAYLIGHT by Mrs. Peter M. Spear, wife of Judge Spear, vice-president of the New York Standard's legal division.

FINANCE

Paris

OIL stocks on the Paris Bourse attained another low-water mark during the latter half of April and beginning of May. They rallied slightly, however, during the middle of the month under the influence of the publication of a few balance sheets showing better profits for 1930 than had been expected.

Petroleum and political circles in this country have been somewhat agitated lately by the so-called scandal of the "S. des Naphtes de Bakou," a company that operated in Russia before the revolution and which had many French shareholders. The directors of the company left Russia, and under the pretext of not abandoning the company's possessions, obtained the permission of the French Government to increase the capital stock without being able to continue operations. This move was not generally approved. The directors were attacked and accused of swindling the public. For political reasons Painlevé, Caillaux and others have been implicated by the press. The case already has been before the "Tribunal de Commerce," and the directors acquitted, but their opponents have made an appeal, and the case will now have to come before the *Cour d'Appel.*

IN their report for 1930, the board of directors of the Compagnie Financiére Belge des Petroles Petrofina declared themselves satisfied with the progress made by the Raffinerie de Pétrole du Nord, which is building a refinery at Dunkerque. The company's profits, distributing petroleum products, amounted to Fr.4,688,120 in 1930 and have been put by for amortization. On the other hand the work of building the refinery is progressing satisfactorily, and should be finished by the beginning of 1932. The financial details of the Petrofina company's report were published on page 304 of the April issue of WORLD PETROLEUM. The company distributes petroleum products in Belgium, and last year made a net profit of Fr.50,281,385, compared with Fr.40,521,617 in 1929.

THE Board of Directors of the S. A. E. M. Pechelbronn report upon activities for the financial year ending December 31, 1930. Its comments make interesting reading. To begin with there are vague allusions to possible agreements with other companies interested in the refining industry, which probably mean a merger of some kind in the near future in view of exploiting the Pechelbronn refinery.

Then, in order to increase its distributing organization, Pechelbronn has found it necessary to absorb the S. des Petroles Essences et Naphtes (Pen). For this purpose it has decided to increase its existing capital of Fr.81,000,000 to 130,000,000 by issuing 98,000 new shares of Fr.500; each. Former shareholders have the prior right to subscribe to three of these new shares for every five old ones held. Some alterations to the company's articles will be made when the capital is increased.

Special stress is laid in the directors report upon the fact that fiscal rates have increased by 278 percent since 1921. Pechelbronn paid to the French State Fr.21,535,531 in 1930 whereas in 1921 it only paid Fr.5,684,459. This is another indication of the iniquitous way in which the petroleum industry is made to bear the brunt of taxation in this country. Nevertheless as mentioned in our previous issue Pechelbronn is paying a dividend of 10 percent, and is carrying forward the sum of Fr.4,803,282.

THE Campsa—otherwise known as the Cia Arrendataria Del Monopolios de Petroleos, which has the monopoly of the sale of all petroleum products in Spain, announces a net profit of 17,380,160 pesetas during the previous year. A dividend of 7½ percent is to be paid this year instead of the 7 percent of last year; but a close examination of the company's balance sheet does not convince one of its prosperity. Doubtless the political situation in Spain has increased the difficulties the company has had to contend with. On the other hand it is rumored that the Spanish revolution was fostered and subsidized with the money paid by the Campsa to the Soviets for the oil supplied by them.

OMNIUM International des Petroles announces a net profit of Fr.1,453,911 against Fr.1,351,512 in 1929. No dividend is to be paid this year; the board proposes to put aside Fr.72,695 for legal reserve, Fr.1,350,000 as a reserve against the fluctuations of invested capital and to carry forward Fr. 66,938.

E. J. ANDRE.

New York

THE down trend in the general market and in the oils continued during the past month. Further price weakness was in evidence, especially in the gasoline market, and release of additional

Paris Bourse Prices

1931			April 16 to May 12				
Div.	Par	Share	First	High	Low	Last	Change
30 lei	500 lei	Astra Romana	93	96	90	98	+ 5
....	500 lei	Colombia	82	82	67	74	— 8
50 lei	500 lei	Concordia	70	70	62	64	— 6
....	500 Fr.	Cdre. Gal des Petroles act	....	....	....	....	.....
....	.....	Cdre. Gal des Petroles part.	....	1500	1370	1245	.....
....	500 Fr.	Franco Pol. Petroles act.	67	67	52	58	— 9
....	.....	Franco Pol. Petroles parts	....	....	....	....	.....
1 $	10 $	Franco Wyoming	292	296	263	282	— 10
40 Fr.	500 Fr.	S.G.des Huiles de Petroles act	395	395	341	360	— 35
....	.....	" " parts	134	137	125	135	+ 1
....	500 Fr.	C. Française des Petroles	....	590	587	....	.....
....	500 Fr.	C. Industrielles des Petroles.	830	830	807	822	— 8
70 Fr.	500 Fr.	Lille Bonnieres Colombes prio	945	959	870	890	— 55
45 Fr.	500 Fr.	" " ord.	633	633	606	605	— 28
....	500 Fr.	Malopolska act.	45	46	39	42	— 3
....	.....	Malopolska part.	....	200	130	....	.....
....	.....	Mexican Eagle	....	50	47	46	.....
....	250 Fr.	Omnium Inter. des Petroles	129	129	100	122	— 7
50 Fr.	500 Fr.	Pechelbronn	700	700	695	695	— 5
60 Fr. B.	500 Fr. B.	Petrofina	549	549	503	480	— 69
240 Fl.	1000 Fl.	Royal Dutch	26450	26450	22800	23905	—2545
24 Fl.	100 Fl.	Royal Dutch 1/10	2610	2610	2305	2400	— 210
....	1 £	Shell	385	385	333	338	— 47
25 Fr.	500 Fr.	Steaua Française	180	180	140	161	— 19

poor earnings reports and divided revisions tended to confirm the prevailing gloom rather than clarify the situation. Definite indications are still lacking of a reversal of trend in business as a whole or in the oil industry. The continued pressure of low prices, however, will eventually accomplish readjustment and correction of conditions that have not yielded to cooperation and artificial restriction. Inauguration of proration in East Texas, although not completely effective as yet, is looked upon as favorable since it has arrested the mounting rate of crude production. Gasoline stocks appear to have started their seasonal shrinkage; but prices are at starvation levels, with little prospect of material improvement during the coming months. Domestic consumption of this product is estimated to be running slightly ahead of last year, but the decline in exports leaves the net demand slightly below a year ago.

Both Standard of New Jersey and Standard of New York have declared forthcoming quarterly dividend payments at their old rates, but The Texas Corporation is reducing its rate from $3 to $2 annually with its next quarterly payment. This revision was in general less drastic than expected in view of the company's report for last year indicating $1.53 per share earned, and the fact that conditions in the industry this year have been even less favorable to profitable operations. Other noteworthy dividend changes among American companies include the complete omission of payments on Ohio Oil, which had previously reduced the rate from $2 to a $1 annual basis, and omission of the Standard Oil of Kansas dividend, which had been paid on a $1 basis.

Following release of report for 1930 showing an unexpectedly large decline in earnings, directors of Vacuum Oil Company declared a quarterly dividend of 50 cents a share payable June 20, to stockholders of record May 29, thus placing the issue on a $2 annual basis in comparison with the $4 rate previously paid. The 1930 report is on a consolidated basis, including a substantial number of domestic subsidiaries operating in the refining and marketing branches, the most important part of these having been acquired in the latter part of 1930. It has been the company's policy not to consolidate the foreign marketing subsidiaries, so that earnings of these companies are included in the parent company statement only to the extent of dividends received.

It is, therefore, noteworthy that the parent company withdrew in 1930 from these foreign subsidiaries dividends in excess of their earnings for the year by $6,084,464, equal to $1.08 per share of Vacuum capital stock outstanding. Net profits last year were equal to $20,393,487, in comparison with $35,767,627 in the previous year. Based on the number of shares outstanding at the close of each year these results were equal to $3.62 and $6.96 respectively; but it must be pointed out that the 1930 figure is an over-statement of earnings to the extent of the $1.08 per share withdrawn from the accumulated surplus of foreign subsidiaries, indicating that the actual earnings of last year were equal to $2.54 per share. The balance sheet as of December 31, 1930, showed total current assets of $77,550,933, including $13,914,368 in cash and marketable securities, in comparison with total current liabilities of $13,557,093.

Standard oil company (New Jersey) the largest and strongest of the American oil companies, reported a sharp decline in profits for 1930, with earnings equal to $1.65 a share in comparison with $4.75 reported for 1929. During the year dividends were paid totaling $2 per share and resulting after dividend payments in a deficit of $8,779,024. Some idea of the size and scope of the company's business is given from the total balance sheet assets of $1,770,993,803 and the gross operating income of last year totaling $1,381,879,279. As of December 31, current assets, including $46,657,382 in cash and $179,168,907 in marketable securities at cost, totaled $730,986,691, while current liabilities as of that date amounted to only $169,093,894. The net profit for the year of $42,150,662 represented a decline of 65 percent from the 1929 figure, whereas gross operating income showed a decline of only 9 percent from the previous year. The annual report stated that inventory losses due to lower prices of crude oil and refined products amounted to $31,500,000, equivalent to $1.23 a share.

Imperial oil, ltd., the leading Canadian oil unit and controlled by Standard Oil Company (N. J.), reported a decline in net earnings in 1930 of approximately 28 percent to $19,020,360 and showed a deficit after dividend payments equal to $7,524,800. On a per share basis last year's earnings were equal to 71 cents on 26,557,496 no par value shares outstanding at the end

New York Stock Prices

1931 High	1931 Low	Current Div. $ per Annum	Stock (Par Value $)	April 20 to May 16 Sales (Shares)	First	High	Low	Last	Net Change[1]
23⅝	12½	1.00	Atlantic Refining (25)	100,400	16¼	16⅜	12⅜	14⅝	— 1⅞
14⅜	7⅛	1.00	Barnsdall "A" (25)	82,800	10	10	7⅜	7⅞	— 2⅛
3⅛	1⅛	....	Colon Oil (No)	8,800	1⅝	1⅜	1⅛	1⅛	— ⅜
12	6⅛	....	Continental Oil (No)	153,300	8	8¼	6⅛	6⅜	— 1⅛
3½	2	....	Creole Petroleum (No)	20,700	2½	2½	2	2	— ⅛
75½	50	1.50	Gulf Stream Corp. (25)	21,400	58	58	50	50	— 8
72	52¾	2.00	Humble Oil & Ref. (25)	23,000	54½	55	52¾	52¾	— 1½
18¼	11½	0.50	Imperial Oil, Ltd. (No)	49,800	13⅝	13⅝	11½	12	— 1¾
4⅜	2	....	Indian Refining (10)	9,000	3	3¼	2	2	— 1⅛
15½	11	1.00	International Petr. (No)	113,500	11⅞	12½	11	11¼	— ⅝
20¾	10⅝	....	Mexican Seaboard (No)	237,200	19¼	19¾	13	13½	— 3⅝
19½	8¼	....	Ohio Oil (No)	126,600	12⅜	12⅝	8¼	8½	— 3⅝
36½	29	....	Pan Amer. P. & T. B. (50)	3,600	32	32	29	29¾	— 2½
16⅝	7	....	Philips Petr. (No)	110,200	9⅛	9⅛	7	7¼	— 2
30¾	9¼	....	Prairie Oil & Gas (25)	55,200	12⅜	13	9¼	9¼	— 3⅛
11⅞	5½	....	Pure Oil (25)	80,900	7⅞	7⅞	5½	6½	— 1⅜
6⅜	1¼	....	Richfield Oil (No)	18,900	2⅝	2⅝	1¼	1¼	— 1¼
42⅝	27½	*2.27	Royal Dutch (N. Y.) (13⅓)	136,900	31⅝	32	27½	29	— 4
10¼	4½	....	Shell Union (No)	146,600	6⅝	6⅞	4½	4⅞	— 1⅝
15⅞	8½	1.00	Sinclair Consol. (No)	206,000	11⅜	11⅝	8½	8½	— 4
12⅞	4½	....	Skelly Oil (25)	16,000	7¼	7⅜	4½	4½	— 2¾
51¾	33	**2.50	Standard Oil of Calif. (No)	162,600	42⅞	42⅞	33	35⅜	— 7⅛
38½	24⅝	2.50	Standard Oil (Ind.) (25)	172,100	30½	30½	24⅝	25⅝	— 4⅜
23⅝	17	1.60	Standard Oil (Ky.) (10)	25,500	20	20	17	17⅜	— 2¼
52½	33½	†2.00	Standard Oil (N. J.) (25)	435,300	40⅝	41	33½	35¼	— 5⅞
26	17⅝	1.60	Standard Oil of N. Y. (25)	219,600	20⅞	20⅞	17⅝	18¼	— 2⅝
45¼	34½	††1.00	Sun Oil (No)	5,000	40½	40⅝	34½	35	— 6½
36½	18⅞	3.00	Texas Corp. (25)	339,800	27	27	18⅞	19½	— 7½
9	4¼	0.60	Tide Water Assoc. (No)	81,700	6½	6⅝	4¼	4½	— 1½
26⅝	14	‡2.00	Union Oil of Calif. (25)	56,900	20¼	20¼	14	16½	— 3⅞
69¾	31	2.00	Vacuum Oil (25)	127,200	49½	49⅝	31	31¾	—18½
1⅞	¾	....	Venezuelan Petr. (5)	3,400	⅞	1	¾	1	.....

[1] Since close of last month's table. * Paid for 1930—no regular rate. † Including extras. ‡ Plus 4% in stock. †† Plus 9% in stock. ** Plus 2% in stock.

of the year, in comparison with 99 cents a share earned in 1929. Financial position at the close of last year was very strong with cash alone substantially in excess of total current liabilities.

ROYAL Dutch declared a final dividend for the year 1930 of 7 percent, bringing total disbursements for the year up to 17 percent, in comparison with the 14 percent final dividend and 24 percent total disbursements for the previous year. On the basis of the American certificates the 1930 disbursements totaled $2.27 per share in comparison with $3.20 paid out of 1929 earnings.

The annual statement of earnings, compiled on a parent company basis, showed net available for ordinary shares of 90,013,803 florins,* equal to 17.9 percent on 503,624,000 florins par value outstanding. For 1929 such earnings were 125,128,892 florins, or 24.9 percent on the same par value outstanding. The parent company balance sheet lists total assets of 1,293,664,061 florins, included in which are 502,794,800 florins par value of unissued ordinary shares and 5 percent debentures.

It may be pointed out that in American practice it is not customary to assign any value to unissued stock in the balance sheet. Included among assets is an item of 325,347,861 florins for claims on undertakings in which the parent company is interested. Considering this item among current assets brings that total to 481,496,101 florins, far in excess of current liabilities of 8,446,485 florins. The 4½ percent cumulative priority stock was exchanged into 28,500,000 florins of 5 percent debentures, that are shown in the balance sheet, but which were called for redemption on May 4, 1931. Low interest currently available on surplus funds led to decision to use a portion of them for this redemption. A new item in the balance sheet is the $40,000,000 of 4 percent debentures, series A, underwritten by an American syndicate headed by Dillon, Read & Company, issued in March, 1930.

* 1 florin = $0.402.

ONE of the very few exceptions to the down trend in oil company earnings last year is found in the report of Pan American Petroleum and Transport Company, subsidiary of Standard Oil Company (Indiana), which shows net profits of $13,743,524 in comparison with $9,825,992 earned in the previous year. The report states that the increase in earnings, despite reduced realizations on all products, was brought about principally by decreased cost of gasoline manufactured and sold, which in turn was due to reduction in cost of crude purchased and operation of the Aruba plant, and also through material economies effected in all departments during the year. As of December 31, ratio of current assets to current liabilities was almost five-to-one, while cash and equivalent amounted to $30,458,418, in comparison with total current liabilities of only $13,728,307.

CREOLE PETROLEUM CORPORATION, Venezuelan subsidiary of Standard Oil Company (N. J.), reported net profit for 1930 of $1,655,045, equal to 25 cents a share on 6,524,391 no par shares, compared with 1929 profit of $2,434,189, equal to 41 cents a share on a somewhat smaller number of shares outstanding. This report, like all previous ones, is on a parent company basis and excludes operating losses of subsidiaries amounting to $1,467,284. In other words, consolidated earnings last year were $197,765, equal to 3 cents a share.

A plan has been set in motion for simplification of the conduct of the company's affairs and for effecting economies. It is proposed to make Creole Petroleum the holding company and Standard Oil Company of Venezuela the operating company; three subsidiaries, Webster Syndicate, Condon Oil of Venezuela, and Rio Palmar Oil Fields Corporation, will ultimately be liquidated and dissolved. Beginning with 1931 balance sheets and income statements will be submitted in consolidated form. At close of last year, the company held 6,573,746 acres under oil concessions, of which 4,802,000 acres may be finally retained pursuant to terms of the Venezuelan petroleum law. As a result of drilling operations during the year Creole increased its estimated proven acreage from about 1,000 acres to 5,000 acres. Production of crude in 1930 amounted to 6,859,806 bbl., compared with 7,679,279 barrels in 1929.

ANOTHER important subsidiary of the Jersey company, Humble Oil and Refining which operates in this country, reported a decline in profits last year of 44 percent to $18,083,490, and on a per share basis showed $6.08 earned against $10.93 in 1929.

SHELL UNION OIL CORPORATION, the important American subsidiary of the Royal Dutch-Shell interests, reported for 1930 a deficit, after all charges, minority interests, and interest and discount on funded debt, of $5,095,174 in comparison with net profits in the previous year of $17,573,249. The 1930 loss was equal after preferred dividends to 56 cents per share of common in comparison with common share earnings in 1929 of $1.26. Although financial position at the close of the year was strong, it may be noted that net working capital shrank from $105,005,136 to $73,469,523, while cash and equivalent declined from $58,730,087 to $25,550,462. Operations in the first quarter of 1931 resulted in a deficit equal to 80 cents per share of common in comparison with net loss for the first quarter of 1930 equal to 28 cents per share of common. Preferred dividend payments are still being maintained, although disbursements on the common stock were discontinued with the third quarter of last year.

PURE OIL COMPANY reported for its fiscal year ended March 31, 1931, consolidated net income of $2,617,748, a decline of 60 percent from the previous fiscal year. These earnings are equivalent after preferred dividend requirements to 18 cents per share of common in comparison with $1.51 per share of the previous fiscal year. A satisfactory financial position was reported and preferred dividends have been maintained to date, although payments on the common were discontinued late in 1930.

MARACAIBO OIL EXPLORATION CORPORATION, a holding company controlling oil and gas rights on approximately 475,000 acres in Western Venezuela, reported 1930 net income of $42,461 equal to 13 cents per share of capital stock, in comparison with 1929 net of $63,770 equal to 19 cents per share. As of December 31 the company had total current assets of $785,426, including cash of $287,746, and no current liabilities.

C. C. BAILEY.

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London

CIRCUMSTANCES have combined to produce a state bordering on demoralization in the London oil share market. Advices from the United States have been depressing, with cuts in dividends of prominent American companies and no apparent end to overproduction in sight. Conditions in the market here have contributed to the price decline, the general fall in security values having brought out distress selling of the leading oil shares, particularly from the Glasgow exchange, which deals heavily in Burmahs and Anglo-Persians. The

addition of 2d. per gallon to the motor fuel tax in the Budget was another adverse factor, while the eagerly expected dividends just announced by some of the foremost British undertakings tally with the least optimistic market estimates.

Prices of the more active counters during recent weeks have sustained the heaviest fall experienced for a long period, and show practically no recovery from the worst. Most of them stand at the lowest for many years. The main reason for the decline is that the British investing public has got thoroughly frightened at the oil outlook. Many conservative holders of the leading shares have held them up to the present in the belief that, for one cause or another, the oil situation would right itself before long. The sound financial position of the companies has been relied upon to pull them through the period of overproduction with flying colors.

It is now being realized that all undertakings are subject to the effects of depression, and with prices continually falling away, holders have been getting out in the hope of reinvesting at a lower level. The market has thus had to face a good deal of realization of extensive investment holdings, in addition to the shares thrown over by distressed speculators, with little or no support from new buyers. Despite the low quotations now ruling, dealers refuse to predict that the worst has happened. All that is clear at the moment is that, in view of current low levels, the upward reaction, when it comes will probably be both extensive and rapid.

PRELIMINARY profits of the Burmah Oil Company make a relatively good showing. After charging field expenditure and depreciation, and allowing for income tax, earnings for 1930 were £2,736,013 a reduction of £701,459 from 1929. Reserve allocations are increased, but nothing is to be written off investments in subsidiary companies, which were written down by £500,000 a year ago. A final dividend of 12½ percent will make the total 22½ percent, a reduction of 7½ percent from last year; but the unappropriated surplus is increased by over £200,000.

The question of depreciation of the company's investments raised considerable discussion in the market in view of the absence of any specific provision from profit for this purpose. A large part of the holdings consists of British Government securities, which should have appreciated during the past year. The 1929 balance sheet showed an investment in 2,861,990 Anglo-Persian ordinary shares, valued at under 12/ per share, and therefore still conservatively valued. Other holdings of the company include B.O.C. Anglo-Persian Share Trust, Shell Transport ordinary, and Burmah-Shell Oil Storage and Distributing Company shares. The market believes that, taken together, the investments are still very moderately valued, and the directors' decision not to appropriate any of the past year's profit to reduce the valuation appears to confirm this view.

VENEZUELAN OIL CONCESSIONS, the principal operating subsidiary of the Royal Dutch-Shell group in Venezuela, has evidently done relatively well. It is paying a final for last year of 12½ percent, making 17½ percent for the whole of 1930. This distribution is not strictly comparable with that received by shareholders in 1929, for last year the V.O.C. Holding Company, whose shares were formerly held by the public, was liquidated and shares of the operating company were issued in exchange. At the same time, additional shares were issued, and although the rate on the Holding Company's shares for 1929 was 20 percent, the amount absorbed was £1,079,759, whereas the 17½ percent on the reconstituted concern will require £1,259,540. The company sells its output to the Shell interests, but has to pay transport charges. Lower freights may therefore have contributed to keep up profits, as well as reduced expenditure owing to restricted drilling.

SALES of products by Trinidad Leaseholds during nine months to March 31, 1931, show a slight increase in comparison with the corresponding period of 1929-30, and it is anticipated that the position for the full year will be maintained. On account of the fall in prices, revenue has necessarily declined, and although reductions have been made in expenditure, profit for the full accounting period will be less than for the preceding year. In view of this prospect, and continued uncertainty as to the future course of oil prices, the directors are deferring consideration of a dividend until later in the year. A year ago an interim of 7½ percent was paid, but no final was forthcoming for 1929-30 owing to the necessity for conserving cash resources.

MCCOLL-FRONTENAC OIL COMPANY, Ltd., a comparatively small unit operating in the refining and marketing divisions in Canada, reported net income for the fiscal year ended January 31, 1931, of $1,191,983, in comparison with $1,431,970 in the previous year. At the annual meeting it was stated that company's sales so far this year have shown a material gain over last year.

ALEC H. DAY.

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One of the most striking proofs of the recent efforts made in the U. S. A. to curtail drilling is demonstrated by the fact that only 1320 productive and 602 dry oil wells were drilled in January and February of 1931, compared with 3,119 and 573 respectively in the first quarter of 1930. Yet the East Texas oil boom has done much to offset curtailment.

London Stock Exchange Prices

1931 High	1931 Low	Last Year's Div. % per Ann.	Share	April 23 to May 15 First	High	Low	Last	Change
9/16	1/4	3½	Anglo-Ecuadonian	13/32	13/32	1/4	1/4	— 5/32
2 5/8	1 9/16	17½	Anglo-Egyptian "B"	2 5/32	2 1/32	1 9/16	1 9/16	— 19/32
2 13/32	1 15/32	20	Anglo-Persian	1 15/16	2	1 15/16	1 15/32	— 15/32
5/8	5/8	25	Apex Trinidad (5s.)	1/2	1/2	3/8	3/8	— 1/8
21/32	9/16	....	Attock	3/4	3/4	9/16	3/4	.....
5/16	7/32	5	Brit. Borneo (10s.)	5/16	5/16	1/4	1/4	— 1/16
7/32	3/16	6¾	Brit. Burmah (8s.)	3/16	3/16	3/16	3/16	.....
5/32†	1/16†	‡	Brit. Controlled ($5.)	1/16†	3/32†	1/16†	1/16†	.....
1/4†	3/32†	....	Brit. Controlled Pfd. ($5.)	5/32†	5/32†	3/32†	3/32†	— 1/16
3½	2 3/16	22½	Burmah	2 25/32	2 29/32	2 3/16	2 5/16	— 15/32
15/32	5/16	12c.	Canadian Eagle (no par)	3/8	3/8	11/32	11/32	— 1/32
11/16	13/32	....	Creole Petroleum (no par)	13/32	13/32	13/32	13/32	— 1/16
3/32	1/16	....	Kern River (10s.)	3/8	3/8	1/16	1/16	— 1/16
1⅛	⅜	12½	Lobitos	1	1	⅜	⅜	— ⅛
17/32	5/16	6	Mexican Eagle ($4. Mex.)	3/8	3/8	5/16	5/16	— 1/16
36½	28	....	Pan American "B" ($50.)	33	33	28	30½	—2½
3/8	3/16	5	Phoenix	5/16	5/16	3/16	3/16	— 1/8
25 5/16	17⅝	17	Royal Dutch (Fl. 100)	20	20	17⅝	18	—2
3 27/32	2 9/32	17½‡	Shell Transport	2 25/32	2 29/32	2 9/32	2 5/16	— 15/32
9/32	5/32	4	Steaua Romana	3/16	3/16	5/32	5/32	— 1/32
1 15/32	⅜	7½	Trinidad Leasehold	1	1	⅜	9/16	— 7/16
9/32	3/16	....	Untd. Brit. of Trinidad (6s.8d.)	7/32	7/32	3/16	3/16	— 1/32
1 25/32	1¼	17½	Venezuelan Oil Concessions	1 7/16	1 15/32	1¼	1¼	— 3/16

Nominal value of shares £1 unless otherwise indicated by bracketed figures. ‡ Denotes tax-free dividend. † Denotes new shares, subsequent to capital reduction. c. Denotes cents per share.

New Equipment and Engineering Information

Testing Lubricants

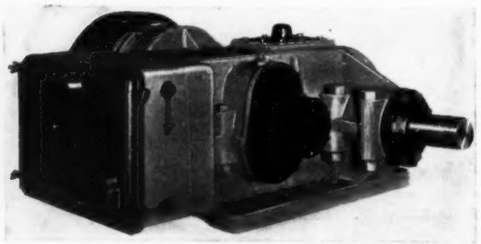
THE function of a lubricant is to prevent the economic waste due to wear and friction. An instrument that will better foretell the ability of a lubricant to reduce friction is an invaluable aid in reducing these great wastes.

When two rapidly rotating pieces of metal are set face to face under pressure with a thin film of oil between them, heat is generated and the lubricating properties of the oil ultimately break down, causing friction to develop, and one piece drags across the other.

The exact point at which lubricating oil breaks down is recorded by a new device known as the Stephens Consistometer. The Consistometer contains two heat-treated discs with precisely ground and polished flat surfaces. One disc is rotated at a constant speed, the other is anchored to a bowl containing the sample of oil to be tested. The temperature of the sample is controlled by a surrounding double-walled oil bath containing an electric immersion heater. As the oil becomes hotter it loses its lubricating properties and greater friction between the discs is generated. The increased friction imparts greater torque to the anchored disc and that torque is graphically recorded on a synchronized rotating chart. Each oil thus writes its own story. The more heat it can withstand, and the longer the discs rotate without dragging or binding, the better the oil. For the mathematically minded, the temperature of breakdown multiplied by grams torque, and by the length of time of test, equals the lubricating index.

New Unit Pumping Power

NEW unit pumping powers, OP-300 series, developed jointly by the Nuttall Works of the Westinghouse Electric and Manufacturing Company and Oil Well Supply Company, embody several outstanding advancements in design and construction of oil well production equipment by which considerable reduction in lifting costs is now made possible.



They are the first and only electric pumping powers having the entire drive—reduction gears, motor and control—combined into a single compact unit of weather-proof construction, thus entirely eliminating the necessity for any shelter house. This unit drive assembly requires only one foundation and once in place there remains only the connection of three wires between the control and the power supply. All other wiring is done during manufacture.

These new OP-300 unit pumping powers are built in three sizes, having capacities up to 40 horsepower and a range of pumping speeds of 10 to 32 strokes a minute with strokes varying in length from 24 to 72 inches. A new type adjustable rotating counterbalance crank of practical and unique design and particularly suited for equipment expressly designed for pumping only has been provided. A considerable number of these new pumping equipments are already in operation in California and Mid-Continent fields.

Scammell Pipe Truck

PIPE line construction creates an overland transportation problem which calls for rugged vehicles. To meet this situation Scammell Lorries, Inc. have developed the Pioneer type cross country rigid six-wheel truck pictured in the illustration. Strength and ability to negotiate difficult terrain are the attributes of this huge carrier, which has proved its mettle by taking a 10-ton load of 40 foot pipe across gullies and up loose sandbanks with 16 percent gradients. Some of the outstanding features are: front axle which is of a special rocking type, allowing a full 2 feet of free articulation without distortion of the frame. The axle is attached to a transverse spring which is carried in a trunnion mounting on the front frame cross member. The rear axle also is of unique design, being the subject of a Scammell patent. Instead of having the usual twin axle with double differential gear, a single full floating axle is employed with overhead worm. At the end of each axle shaft is a spur pinion which meshes with an idler pinion on either side, which in turn meshes with a spur wheel mounted on the stub axles, the whole being enclosed

in an oil and water-tight casing. The drive is thus positive, and slip on diagonally opposite wheels is impossible. The engine develops 75 brake horsepower at 1,000 r.p.m., but may be run without distress at 2,000 r p.m. Cooling is by water pump and special "still" radiator on which boiling is unknown even in tropical countries. Speed, 20 miles an hour.

The vehicle is most efficient on cross country operation, even under the most severe conditions. It can surmount banks up to 3 ft. in height, and it can drive through plastic mud up to 2 ft. deep.

Complete Tubing Protection

A NEW tubing catcher distinctive in many points is now being offered by Byron Jackson Company, under the name of "BJ Surestop Tubing Catcher." This catcher consists of 10 parts as compared with approximately three times that number in other catchers. There are no small bolts, nuts, or cotter pins which are easily lost and easily damaged. The entire tool is of rugged construction and easy to assemble.

The over-all length of the "Surestop" has been held to a minimum. Numerous tests have proved that even in crooked holes there is no tendency to catch or hang-up while running in at top speed. Large circulation passages increase the running-in speed. The three slips are of special heat treated steel and their area is almost double that of any other catcher. The tendency of the catcher to bulge or break through the walls of the casing in the event the tubing parts is thus practically eliminated. The extra width of these slips, together with the angle of the teeth, insures catching and holding in a drop not to exceed 2½ inches. A strong guide collar, located near the top of the catcher, prevents any possibility of the slips passing over the head of the catcher—commonly termed "telescoping." Illustrated literature describing the BJ Surestop Tubing Catcher will be forwarded upon request by Byron Jackson Company.

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